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PRELIMINARY AQUATIC ENVIRONMENT AND
FISHERIES INFORMATION FOR INPUT
INTO THE REGIONAL PHOSPHATE PLANNING UNIT

JANUARY 1975



William S. Platts

Zone Fisheries Biologist

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A companion report to Progress Report IV--
Blackfoot Drainage Aquatic Environment and
Fisheries Studies (1975)

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INTRODUCTION

The Phosphate Planning Unit Study Area is drained by tributaries of the South Fork Snake, Salt, Blackfoot, and Bear Rivers and the Grays Lake system. The parent materials of the study unit are mainly marine in origin and composed of limestone, shale, sandstone, mudstone, and chert. These soils, rich in nutrients and other minerals, provide the leaching waters with the basic building blocks needed to produce high aquatic biomass productivity.

The streams support dense populations of the Henrys Lake and Snake River varieties of the cutthroat trout (Salmo clarki Richardson) and less dense numbers of rainbow trout (Salmo gairdneri Richardson), brook trout (Salvelinus fontinalis mitchill), brown trout (Salmo trutta Linnaeus) and whitefish (Coregonus spp.). The surface waters within the study area differ in their ability to produce fishery goods and services so each must be analyzed separately.

The present aquatic environment conditions rate poor to good with irrigation return flows and livestock influence being the highest degrading factors. The increasing production of phosphate ore resulting in large areas of raw man made soils will offer further stress to the fishery resource. Mining stress has already been received in Mill, Angus, McCoy, Georgetown Creeks and others.

The purpose of this compilation of aquatic environment and fisheries information is to provide (1) The general information needed to fulfill the requirements of the Regional land use plan and Environmental Impact Statement and (2) Provide the land manager with some aquatic information that will help in the analysis of the future effects of mining and milling on the aquatic resources. Hopefully, this will initiate the necessary studies needed to allow a better compatibility between mining and other resource uses.

Only a few of the aquatic environments and their fisheries have been studied or even spot checked within the planning unit. Thus, only a few streams have the necessary discription and documentation to fit into a total ecosystem analysis. The factual quantified information will stand the test of time but all SWAG opinions need reevaluation in 1976. An attempt is made, with the limited data, to fit the aquatic environment and fisheries into the landform system within major phosphate use area. The limitation of only one week of field work and the late date this fishery biologist entered the multidiscipline team places restrictions on the use of the information presented. However, it is a beginning, and the information is presented in a form that as studies provide better information this report can continually be upgraded.

OBJECTIVES

1. To provide some initial aquatic environment and fisheries information for inclusion into the Regional and Forest Phosphate land use plan studies.
2. To provide a beginning for documentation of aquatic environment and fishery conditions to assist the land manager in his immediate management program.
3. To initiate the interpretations of fish standing crops, fish species diversity, and macroinvertebrate species diversity and relate this information to present aquatic environmental conditions.
4. To describe the present fisheries potential in the major streams.
5. To interpret the present physical and hydrochemical aquatic environment conditions in certain streams.
6. To offer a generalized list of possible areas that may lend themselves to fisheries mitigation.

METHODS AND EQUIPMENT

Methods and equipment used in this study appear in Appendix E.

ENVIRONMENTAL STREAM DESCRIPTIONS

The majority of the Aquatic Environment within the planning unit is stream type. Much of this stream environment has been modified by beaver to form pond type environments. Lakes, reservoirs, and ponds (other than beaver ponds), make up a minor part of the aquatic environment. All water within the planning unit is very fertile and when a stream forms the aquatic structure, excellent fish populations result. Tables 5 and 6 summarize the stream description information available.

Angus Creek

Environmental conditions are well documented in Angus Creek (Platts 1970a, 1970b, and 1973) and these reports should be referred to for background information. The 1974 Angus Creek information will appear in Progress Report IV (1975).

This stream is rated 4 and contains cutthroat trout, sucker, dace, reidside shiner and sculpin. The stream from the lower end of the Angus narrows upstream to within about 800 yards of its headwaters is dominated by populations of cutthroat trout. Downstream from the Angus narrows the fish species composition is dominated by dace, reidside shiner and sculpin. Angus Creek is important as a feeder of migrant cutthroat trout to the Blackfoot systems. The Stauffer Mining Company has recently constructed a small reservoir near the headwaters of Angus Creek which has been stocked with cutthroat trout. Trout survival and growth has been excellent, averaging about 12 inches at two years of age.

The headwaters of Angus Creek has received accelerated sediment and oils from past mining operations. The Aquatic Studies demonstrate the stream degradation from mining is minor at this time and that livestock grazing is causing more stress. This stream could receive heavy stress from future mining activity.

Bacon Creek

This stream is small and the small size cutthroat trout provides onsite fishery value. Bacon Creek is rated 3 because cutthroat trout from the Blackfoot system use lower stream area for spawning and rearing.

Table 5. Aquatic environment and fishery conditions within the Caribou National Forest, phosphate land use study area (1974). See pages 100 and 101.

Stream Lake or Stream	Fish Species Present								Contributes Cutthroat to Blackfoot System	Stream fishery rating and environmental influence						Condition					
	Rainbow Cutthroat	Brook	Brown	Whitefish	Sucker	Dace	Shiner	Sculpin		Fishery	Livestock Influence	Logging Influence	Road Influence	Mining Influence (Present)	Mining Influence (Future)	Ephemeral Stream	Perennial Stream	Resident salmonid	Hatchery salmonid	Snake River cut (S) or Henry's Lake cut (H)	
Angus	X				X	X	X	X	X	4	3	4	5	4	2		X	X	X	H	
Bacon	X								X	3	3	5	5	5	5		X	X		H	
Bear	X					X		X		3	2-3	5	3	4	3		X	X		S	
Bear Canyon	X								X	2	3	5	4	5	4		X			H	
Beaver Dam	X									2	2	5	5	5	3		X	X	X	H	S
Blackfoot	X	X	X	X	X	X	X	X	X	5	3	5	5	5	3		X	X	X	H	
Big Canyon										1	5	5	5	5	5	X					
Books	X									2	3	5	5	5	5		X	X		H	S
Browns	X								X	2	4	4	3	5	5	X	X	X	X	H	
Cabin	X								X	3	4	5	5	5	1	X	X	X		H	
Cambell Canyon										1	3	5	5	5	4	X					
Camel Hollow	X									1	3	5	5	5	5	X	X	X			S
Canyon										1	5	5	5	5	5	X					
Carralsen	X								X	1	4	4	5	5	5	X	X				
Clear	X									3	2	4	5	5	3	X	X	X		H	S
Coyote	X								X	2	3	5	5	5	3		X	X		H	
Crow	X		X	X	X			X		5	2	4	5	5	3		X	X	X	H	S
Dairy	X									2	3	5	5	5	5		X	X			
Davies	X								X	2	2	4	5	5	5	X	X	X		H	
Deer (Main)	X	X	X	X						4	2	5	5	5	1		X	X	X	H	S
Deer (South)	X									2	3	4	5	5	1	X	I	X	X	H	S
Deer (North)	X									2	4	5	5	5	1		X	X	X	H	S
Diamond	X	X		X				X	X	4	3-2	4	3	4	2	I	X	X	X	H	

Table 5 (cont'd.)

Stream Lake or Stream	Fish Species Present									Contributes Cutthroat to Blackfoot System	Stream fishery rating and environmental influence						Condition					
	Rainbow	Cutthroat	Brook	Brown	Whitefish	Sucker	Dace	Shiner	Sculpin		Fishery	Livestock Influence	Logging Influence	Road Influence	Mining Influence (Present)	Mining Influence (Future)	Ephemeral Stream	Perennial Stream	Resident salmonid	Hatchery salmonid	Snake River cut (S) or Henrys Lake cut (H)	
Dry Canyon											1	5	5	5	5	5	X					
Dunns		X									1	3	5	5	5	5	X	X	X		H	
Ephriam Valley		X		X					X		3	2	5	5	5	5		X	X	X	H	S
Fall		X	X				X		X		4	2	5	4	3	2		X	X		H	S
Fossil											1	5	5	5	5	5	X					
Georgetown (Main)	X	X	X						X		5	2	5	3	3	1		X	X	X	H	
Georgetown (Left)	X	X	X						X		2	3	5	4	5	3		X	X	X	H	
Georgetown (Right)		X									2	3	5	3	3	2		X	X		H	
Goodheart		X	X						X		2	3	5	5	5	4		X	X		H	
Gravel			X						X		2	3	4	5	5	5		X	X			
Hornet		X									1	2	5	5	5	4	X	I	X		H	
Indian											1	5	5	5	5	4	X					
Jack Hollow											1	5	5	5	5	5	X					
Johnson											1	5	5	5	5	5	X					
Jones											1	5	5	5	5	5	X					
Kendall		X								X	3	4	5	5	4	4		X	X		H	
Lake Gulch											1	5	5	5	5	5	X					
Lanes		X							X	X	4	3	4	5	4	2		X	X	X	H	
Mabie		X									1	2	5	5	1	1	X	X	X		H	
Manning											1	3	4	5	5	4	X	X				
Meadow Springs											1	5	5	5	5	5	X					
Mill Cr��ek (1)		?								?	1	2	5	5	3	2		X	X		H	
Mill Creek (2)		X								X	2	3	4	5	4	3		X	X		H	

Mill Creek (1) enters Blackfoot narrows

Mill Creek (2) enters Diamond Creek

Table 5. (cont'd.)

Stream Lake or Stream	Fish Species Present								Contributes Cutthroat to Blackfoot System	Stream fishery rating and environmental influence						Condition						
	Rainbow	Cutthroat	Brook	Brown	Whitefish	Sucker	Dace	Shiner		Sculpin	Fishery	Livestock Influence	Logging Influence	Road Influence	Mining Influence (Present)	Mining Influence (Future)	Ephemeral Stream	Perennial Stream	Resident salmonid	Hatchery salmonid	Snake River cut(S) or Henrys Lake cut(H)	
Montpelier	X	X	X	X					X		5	3	5	4	4	4		X	X	X		H
Mosquito		X								X	2	3	4	5	5	3		X	X	X		H
Nate											1	4	5	5	5	5		X				
Olson		X	X							X	2	3	4	5	5	5			X	X		
Pine Canyon											1	5	5	5	5	5		X				
Pole Canyon		X									2	3	5	5	5	3			X	X	X	H S
Pruess		X							X		4	2	5	5	5	5			X	X	X	H
Rattlesnake											1	5	5	5	5	5		X				
Red Pine											1	5	5	5	5	5		X				
Sage Main		X		X	X	X			X		4	3	5	5	5	4			X	X	X	H S
Sage South		X		X					X		3	3	5	5	5	4		X	X	X	X	H S
Sandy Wash											1	5	5	5	5	5		X				
Sheep		X							X	X	5	3	5	5	4	3			X	X	X	H
Smoky Canyon		X									2	3	4	5	4	3		X	X	X	?	?
Stewart		X								X	2	3	5	4	4	1			X	X		H
Slug		X	X			X	X		X	X	4	2	5	5	5	2			X	X	X	H
Stump		X									4	3	5	5	5	5			X	X	X	H
Sulphur		?									1	3	5	5	4	3		X	X			
Swan Lake	X										3	5	5	5	5	3			X		X	
Swan Reservoir						X					1	5	5	5	5	4						
Three mile											1	5	5	5	5	5		X				
Timber		X								X	2	3	4	3	4	3		X	X	X		H
Timothy		X								X	2	3	5	5	5	5		X	X	X		H
Trail		X									2	3	4	5	4	3		X				
Tygee		X		X							2	3	5	5	5	4			X	X	X	H S

Table 5. (cont'd.)

Stream Lake or Reservoir	Fish Species Present									Contributes Cutthroat to Blackfoot System	Stream fishery rating and environmental influence						Condition					
	Rainbow	Cutthroat	Brook	Brown	Whitefish	Sucker	Dace	Shiner	Sculpin		Fishery	Livestock Influence	Logging Influence	Road Influence	Mining In- fluence (Present)	Mining Influence (Future)	Ephemeral Stream	Perennial Stream	Resident salmonid	Hatchery salmonid	Snake River cut (S)	Henrys Lake cut (H)
Webster		X									5	3	5	5	5	5	X	X	X	X		S
Wells Canyon		X									1	3	5	5	4	3	X	X	X	X		
White Dugway		X		X					X		3	2	5	5	5	5		X	X	X	H	S
Wood Canyon											1	5	4	5	5	5	X					
Yellowjacket		X								X	2	2	5	5	4	1	X	X	X	XX	H	
Warm		X		X							2	3	5	5	5	5		X	X	X	H	S

Table 2. Aquatic environment, and fishery information in waters outside the Caribou Phosphate Planning Unit but within the Regional Phosphate Planning Unit (1974). See pages 100 and 101.

Stream Lake or Reservoir	Fish Species Present													Fishery Rating		Environmental Influence Rating										
	Rainbow Cutthroat	Brook Brown	Whitefish Sucker	Dace Shiner	Sunfish Cisco	Laketrout Carp	Chub Perch	Bluegill Sculpin	Livestock Logging Roads	Mining (Present) Mining (Future)	Ephemeral	Perennial	Hatchery Stocking													
Alexander Res.	X	X			X	X	X	X			X	X				2		4	5	5	3	2		X	X	
Antelope Cr.																1		4	5	5	5	5	X	X		
Bear Lake	X	X	X		X	X	X	X	X	X	X	X	X	X		4		4	5	5	5	5		X	X	
Bear Lake Outlet	X	X	X		X	X	X	X	X		X	X	X		X	2		4	5	5	5	5		X	X	
Bear River	X	X			X	X	X	X	X		X	X	X		X	3		2	5	5	5	5		X	X	
Bear River-Thomas R.	X	X			X	X					X				X	3		3	5	5	5	5		X	X	
Birch Cr.		X														2		3	5	5	5	5		X		
Blackfoot Res.	X	X	X		X	X	X	X			X	X				5		4	5	5	4	3		X	X	
Bloomington Cr.	X	X	X		X						X				X	4		4	5	5	5	2			X	
Bloomington Lake	X	X	X													5		5	5	5	5	5		X	X	
Chesterfield Res.	X	X			X	X	X					X				4		4	5	5	5	5		X	X	
Eight Mile	X	X	X													3		3	4	5	5	5		X	X	
Fish Haven	X	X	X					X								3		4	4	5	5	5		X	X	
Grays Lake Outlet	X	X	X	X			X	X								3		4	5	5	5	5			X	
Grays Lake							X	X								1		4	5	5	5	5	X	X		
Jackknife Cr.		X														3		3	5	5	5	5			X	
McCoy Cr.	X	X	X		X										X	3		4	5	5	2	2			X	
Meadow Cr.		X									X					2		3	5	5	5	5		X		

Table 2. Aquatic environment and fishery information in waters outside the Caribou Phosphate Planning Unit but within the Regional Phosphate Planning Unit (1974). See pages 100 and 101.

Stream Lake or Reservoir	Fish Species Present														Fishery Rating	Environmental Influence Rating							
	Rainbow Cutthroat	Brook Brown	Whitefish Sucker	Dace Shiner	Sunfish Cisco	Laketrout Carp	Chub Perch	Bluegill Sculpin	Livestock	Logging	Roads	Mining (Present)	Mining (Future)	Ephemeral		Perennial	Hatchery Stocking						
Meadow Cr. (SFSR)	X														X	X							
Mill Cr.	X	X														X	X						
North Canyon	X															X	X						
Palasades Res.	X	X	X	X	X											X	X						
Pearl Cr.	X															X	X						
Portneuf Riv.	X	X	X	X	X	X	X		X	X			X			X	X						
Saint Charles Cr.	X	X	X		X				X				X			X	X						
Skinner Cr.	X															X	X						
Soda Cr.																X	X						
Stauffer Cr.	X															X	X						
Tincup Cr.	X	X	X	X													X						
Twenty-Four Mile Res.	X							X	X							X	X						
Willow Cr.	X	X	X	X	X					X							X						
Wolverine Cr. (McCoy)	X															X							
Wolverine (Blackfoot)	X															X							

FISH POPULATIONS

Fishing pressure is moderate to intense in the higher quality streams (4-5). The lower rated streams (1-2) are seldom used. Fishing intensity occurs mainly from June through September, during low water flows. Peak stream flows normally occur during mid-April to early May as the snow melts. During this period fishing intensity diverts to the lakes or reservoirs. Fish species present with abundance rating appears in Table 3.

Each stream, lake, or reservoir is classified as to fishing quality (Table 1 and Appendix B) and fish species location (Table 4 and Appendix C).

Bear Creek

Bear Creek, because of an annual cutthroat trout spawning run from Palasades Reservoir, could contain a pure strain of the Snake River variety. In the past, the Henrys Lake variety has been stocked but probably failed to take hold. Bear Creek is rated a high 3 although it receives heavy livestock stress in upstream areas and roads are eroding materials into the stream.

Some mining activity presently exists and it's predicted this stream will receive increased stress from future mining. This stream is an important spawning and rearing area for the Palasades cutthroat trout population.

Bear Canyon

Bear Canyon is a small stream that provides a minor fishery and contributes cutthroat trout to the Blackfoot system. The stream is rated 2, receives livestock stress and is predicted to receive light stress in the future from mining.

Beaver Dam

Beaver Dam is a small stream receiving heavy damage from livestock. The stream lacks quality but is rated 2 because it contains the Snake River and Henrys Lake variety of the cutthroat trout. This stream will be influenced by future mining operations.

Blackfoot River

The Blackfoot River contains more fish species and more fishing pressure than any other stream in the planning unit. Fish species collected were rainbow trout, cutthroat trout, brown trout, whitefish, sucker, dace, redbside shiner, carp, and sculpin.

The stream is rated 5 and receives streamside damage from livestock. The overall accumulation of stress in the tributaries from future mining activity could degrade this stream and in turn the Blackfoot Reservoir. These two systems combined contribute the main fishery in south-eastern Idaho.

Big Canyon Creek

This ephemeral stream is rated 1 and has no fishery value.

Brooks Creek

This small stream is rated 2, and provides very low fishery values. The stream contains both the Henrys Lake and Snake River variety of cutthroat trout. The streamside environment receives livestock damage.

Browns Creek

This small stream is rated 2, and has segments that dry up. Browns Creek has little fishery value but does provide cutthroat trout migrants to the Blackfoot system of the Henrys Lake variety. Roads are causing accelerated sediment to enter the stream.

Cabin Creek

This stream is rated 3 because it is capable of rearing and/or holding large cutthroat trout. The stream seeds cutthroat trout migrants into the Blackfoot system. This stream may be completely wiped out from future mining operations.

Cambell Creek

This stream is rated number 1 because of ephemeral conditions which result in no fishery values.

Camel Hollow Creek

This stream contains the Snake River variety of the cutthroat trout. Because of the small size and ephemeral condition it is rated 1 with no fishery value.

Canyon Creek

Canyon Creek is mainly ephemeral, has no fishery value, rates 1, and flows into the Bear River drainage.

Carralsen Creek

Carralsen Creek is rated 1 but does contain small numbers of cutthroat trout. This stream could supply some cutthroat trout to the Blackfoot system, as it is a tributary of Lane's Creek.

Clear Creek

This small stream contains cutthroat trout and its modification by beaver, gives it a 3 rating. The stream receives heavy damage from livestock and future mining could also cause further degradation. This stream contains both the Henrys Lake and Snake River varieties of the cutthroat trout.

Coyote Creek

Coyote Creek is a small stream that rears cutthroat trout that migrate to the Blackfoot system. The stream receives very little fishing because of its small size and is therefore, rated 2. Coyote Creek receives damage from livestock and it is predicted that it will receive stress from future mining operations.

Crow Creek

This stream contains cutthroat trout (Henrys Lake and Snake River variety), brown trout, whitefish, and sculpin. Crow Creek rates 5 because it supports high fish populations. Livestock are causing stream side damage and future mining activities could cause further degradation.

Dairy Creek

Dairy Creek contains small size cutthroat trout and is rated 2 because of its small size and low fishery value. The streamside environment receives damage from livestock.

Davies Creek

Davies Creek is small, has low fishery value, and received a 2 rating. The stream contains small size cutthroat trout and receives severe damage from livestock. The stream has perennial flows below the Forest Service boundary but above the channel is mainly ephemeral.

Deer Creek (Main)

This stream contains trout populations from the headwater to the mouth. Because of high standing crops of trout and fishing pressure the stream is rated 4. The stream receives severe damage from livestock and it is predicted that future mining will wipe out this stream. Fish populations include both varieties of cutthroat trout along with brook trout, brown trout and whitefish.

Deer Creek (South)

This tributary is small, rated 2, and contains both varieties of cutthroat trout. Deer Creek (South) receives damage from livestock and it is predicted to receive heavy stress from future mining. Some channel areas are intermittent during summer and fall.

Deer Creek (North)

This small tributary is rated 2 because it has low fishery values. Livestock influence is minor but predicted mining influence will be major. The stream contains both varieties of the cutthroat trout.

Diamond Creek

Diamond Creek contains cutthroat trout (Henrys Lake variety), brook trout, whitefish and sculpin. This stream was once a very important tributary to the Blackfoot River but appears to have become degraded in recent years. I believe its loss of productivity can be contributed to livestock influences and changes within the beaver impoundments.

The stream is rated 4 but capable of being a 5. Projected influence from mining is rated high and areas of the stream could be destroyed or completely dewatered.

The upper channel becomes intermittent in many areas. The stream is stocked annually with the Henrys Lake cutthroat trout but the efficiency of this stocking is unknown.

Dry Canyon Creek

This stream is small, ephemeral and rated 1; there is no fishery value.

Dunns Creek

This stream is small, has ephemeral channels in upper areas, and receives livestock damage. Because the stream supports cutthroat trout, it is rated 2.

Ephraim Valley

This stream has a low channel gradient and is rated 3 because of good populations of cutthroat trout and brown trout. The streamside environment receives severe livestock damage. The stream contains the sculpin and both the Henrys Lake and Snake River cutthroat trout.

Fall Creek

Fall Creek drains into the South Fork Snake River and contains high populations of both varieties of the cutthroat trout. The stream is rated 4 and receives severe damage from livestock. Future mining will also cause severe impact. A travertine dam creates a migration barrier at the mouth and blocks potential spawning migrations from the South Fork Snake River.

Fossil Creek

Fossil Creek is small, ephemeral, and has no fishery values.

Georgetown Creek (Main)

Georgetown Creek supports the highest poundage of salmonids per stream length, found in the study area. During the past, mining and milling operations, killed the trout population below the mill to the downstream Forest Service boundary. Since mining and milling operations have ceased, trout populations have returned. The stream in undisturbed areas contains excellent populations of rainbow trout, cutthroat trout (Henrys Lake variety), brown trout and sculpin.

The stream receives a 5 rating because of its large size and high fish standing crops. Livestock cause some stress in the upper section. If past mining and milling activities resume, its predicted that fish populations below the activity will again be wiped out. Roads have altered long segments of the stream channel. Additional information occurs in the Appendix.

Georgetown Creek (Left)

This stream is small, has some influence from sheep and is rated 2. It has channel segments altered by roads and future stream stress is predicted if new mining operations resume.

Georgetown Creek (Right)

This stream is small and receives almost no fishing pressure because of the small size of the cutthroat trout. The stream is rated 2, has some livestock influence, and has channels altered by roads. Past mining has caused some stream damage and its predicted future mining will do more intensive damage.

Goodtown Creek

Goodtown Creek is small, is rated 2, and contains low populations of small size cutthroat trout, brown trout and sculpin.

Gravel Creek

Gravel Creek is small, is rated 2, and contains high standing crops of small size brook trout. Brook trout were the only species found in the sampling. Most of the brook trout population occurs below the Forest Service campground. The stream has been modified by beaver and other stream areas are influenced by livestock.

Hornet Creek

Hornet Creek is ephemeral and in some sections, intermittent, but it does contain a few, small size, cutthroat trout of the Henrys Lake variety. The stream is rated 1 and has no fishing value.

Indian Creek

This stream is small, ephemeral, has little fishery value, and is rated 1. Drainage is into the South Fork Snake River.

Jack Hollow Creek

Jack Hollow Creek is a small stream, has no fishery value, and is rated 1.

Johnson Creek

Johnson Creek is a small stream, has no fishery value, and is rated 1.

Jones Creek

This stream is small and ephemeral with no fishery value. Drainage is into the Bear River.

Kendall Creek

Kendall Creek contains a few small size cutthroat trout. The high channel gradient and lack of good pools results in low fish standing crops. The stream is rated 3, because better stream conditions occur below the Forest Service boundary, and the stream provides some spawning environment for fish from the Blackfoot system.

Lake Gulch

Lake Gulch is a small, ephemeral stream with no fishery value.

Lanes Creek

Lanes Creek is one of the better streams and is rated 4. Fish species include the cutthroat trout and the sculpin. This stream provides major spawning areas for cutthroat trout from the Blackfoot system. Livestock have degraded the streamside environment and future mining is predicted to compound this degradation.

Mabie Creek

This stream is small but does contain a few small size cutthroat trout. The stream has low fishery value, is rated 1, receives livestock damage, and is predicted to be wiped out by future mining activities.

Manning Creek

This stream is small, mainly ephemeral, has very little fishery value, and is rated 1.

Meadow Springs Creek

This stream is small, is ephemeral, has no fishery value and is rated 1.

Mill Creek (1)

Mill Creek is very small and may not contain fish. The stream has received livestock damage and accelerated sediment from past mining operations. More stream damage will occur as mining operations continue.

Mill Creek (2)

This stream is small, contains cutthroat trout, and is rated, 2. The stream is receiving some influence from livestock and could receive further stress from future mining.

Montpilier Creek

Montpilier Creek is one of the most productive streams in the area and is rated 5. The stream contains rainbow trout, cutthroat trout, brook trout, brown trout, and sculpin. Water flow is modified by a reservoir. This stream is one of the few in the planning unit that receives annual stocking of catchable size hatchery rainbow trout.

Mosquito Creek

The stream is small, is rated 2, has ephemeral segments, and contains small size cutthroat trout. There is some movement of cutthroat trout to the Blackfoot system. Livestock influence is being received and future stress will be received from future mining operations.

Nate Creek

Nate Creek is small, ephemeral, rated 1, and has no fishery value.

Olson Creek

Olson Creek is rated 2 because it contributes cutthroat trout to the Blackfoot system. The stream also contains brook trout and receives some livestock influence. The stream is dominated by beaver which are causing fish migration blocks. Fish presently occur in all the beaver dams except the upper one in the headwaters,

Pine Canyon Creek

This stream is small, ephemeral, rated 1, and has no fishery value.

Pole Canyon Creek

Pole Canyon Creek is small, contains both varieties of cutthroat trout and is rated 2. The stream receives some livestock influence and is predicted to receive damage from future mining.

Pruess Creek

This stream contains large beaver dams in the upper section. Because of a high cutthroat trout (Henrys Lake variety) standing crop and fishery use the stream is rated 4. Some stream segments receive intensive livestock damage.

Rattlesnake Creek

Rattlesnake Creek is a small ephemeral stream with no fishery value. Drainage is into the Bear River.

Red Pine Creek

This stream is small, ephemeral, rated 1, and has no fishery value..

Sage Creek (Main)

Sage Creek rates high (4) because of its larger size and high salmonid standing crops. The stream contains cutthroat trout (both varieties) brown trout, whitefish, sucker, and sculpin. There is livestock influence and its predicted that future mining will add to this influence.

Sage Creek (South)

The South Fork Sage Creek contains predominantly cutthroat trout with low standing crops of brown trout and sculpin. The stream rates 3 and has some livestock influence. The upper stream section is ephemeral. Cutthroat trout are composed of both varieties.

Sandy Wash Creek

This small, mainly ephemeral stream is rated 1 and has no fishery value. The upper section dries up and the lower section averages only about one foot in width during low flows.

Sheep Creek

Sheep Creek, historically has been the spawning area for large runs of cutthroat trout from the Blackfoot River and Reservoir. These runs used to be composed of very large cutthroat trout spawners from 4 to 12 pounds in weight. Now most spawners range from 1.5 to 3 pounds. This could be due to the replacement or mixture of the historic Yellowstone black spotted cutthroat trout with the Henrys Lake cutthroat trout upon eradication of the Blackfoot River and Reservoir during the 1960's. Sheep Creek has quality rating of 5 because of the cutthroat trout rearing potential. The stream also contains sculpin and receives damage from livestock grazing.

Smoky Canyon Creek

This stream is small and partly ephemeral, but does contain low numbers of small size cutthroat trout. Smoky Canyon Creek receives damage from livestock and is predicted to receive additional stress from future mining activities.

Stewart Creek

This stream is small with a very low cutthroat trout standing crop. The stream has very low fishery value, but could contribute small numbers of cutthroat trout to Diamond Creek. During late summer and fall, this stream provides rearing areas for trout leaving Diamond Creek. Stewart Creek receives some livestock stress and is predicted to be wiped out by future mining activities.

Slug Creek

Slug Creek is one of the more important streams and is rated 4. Livestock is causing severe damage in certain stream sections and predicted mining influence will compound this. This stream contains cutthroat trout, brook trout, sucker, dace, and sculpin.

Stump Creek

Stump Creek has high fish standing crops and is rated 4. Cutthroat trout of the Snake River variety are the dominant species. The stream receives some livestock influence.

Sulphur Creek

This stream is small, ephemeral, rated 1 and has no fishery value.

Three Mile Creek

Three Mile Creek is small, ephemeral rated 1 and has no fishery value.

Timothy Creek

This stream is small and in some sections ephemeral. Timothy Creek is rated 2 based on the small size cutthroat trout it contributes to the Blackfoot system. Some livestock influence occurs.

Trail Creek

Trail Creek is small, ephemeral, but is rated 2 because it does contain small size cutthroat trout of the Henrys Lake variety.

Tygee Creek

Tygee Creek is small, rated 2 and contains cutthroat trout (both varieties) and brown trout. Some livestock influences occur.

Warm Creek

This small stream has little fishery use but is rated 2. Warm Creek contains cutthroat trout (both varieties) and brown trout and is dominated by beaver dams. Livestock influences the non-beaver stream areas and there are no predicted mining problems.

Webster Creek

Webster Creek drains into the Salt River system and is rated 5 because of the pure strain of Snake River cutthroat trout which are reared in a hatchery in the Idaho portion of the stream. The stream receives some degradation from livestock but no projected mining problems. This stream needs intensive management because of its unique capability of rearing the Snake River cutthroat trout in Idaho.

Wells Canyon Creek

This stream contains small size cutthroat trout in the upper section but the lower section is too steep for a fishery. A rating of 1 is given because there is no fishery value. Some stream sections are ephemeral.

White Dugway Creek

This stream has low channel gradient and is rated 3 because it contains good populations of cutthroat trout (both varieties) and brown trout. The stream also contains sculpin and receives severe livestock damage.

Wood Canyon Creek

This stream is small, ephemeral, rated 1, and has no fishery value.

Yellowjacket Creek

This small stream rates 2 because it contributes cutthroat trout to the Blackfoot system. Severe stress from livestock is received and it is predicted that future mining activities will wipe it out.

LAKE, RESERVOIR AND POND DESCRIPTIONS

Angus Reservoir

This reservoir (1½ acres) was constructed to catch sediment from upstream mining operations and store water for road sprinkling. Because it is continuously spring fed, the reservoir provides an excellent fish environment. The waters were stocked with cutthroat trout in 1972 and by 1974 these trout had reached about 12 inches in length.

This reservoir should continue to provide good fishing in the future if its not filled with mine sediments.

Swan Lake

Swan Lake is about 3/4 acre in size and is stocked annually with hatchery catchable size rainbow trout. The lake is rated 3 as a fishery and could receive modification from future mining. Swan Lake waters are tapped, via a underground pipe, and used for cropland irrigation. Thus, the water level is not stable. The maximum water depth is 40 to 48 feet Without continual fish stocking this pond would not support a fishery

Swan Reservoir

Swan Reservoir is shallow and marshy with a maximum depth of about 3 feet. It contains a sucker population but salmonids fail to survive thru the winter.

Alexander Reservoir

This reservoir is mainly a non-game fishery composed of carp, sucker, and Utah chub. The reservoir provides occasional rainbow trout fishing and there is some rainbow trout stocking in the deeper water near the dam.

Heavy loads of silt from the Bear River pollute the waters and keep it from becoming a salmonid fishery. However, the reservoir does have high water temperatures. At capacity the reservoir covers 1,007 surface areas and contains 15,000 acre-feet. Utah suckers are the dominant fish followed by yellow perch and carp.

Bear Lake

Bear Lake is a young, cold body of water that is low in fertility, but its conversion to a eutrophic lake has begun. The increasing human populations are changing the lake and its future will see many changes due to the continuous increase of organic materials. Water chemistry is being altered and fish populations will change density, type, and size.

Bear Lake is oval-shaped, about 20 miles long and 8 miles wide. The lake has a 48-mile shoreline and a surface area of 110 square miles. About 50 percent of the lake is more than 100 feet deep; one small area is 208 feet deep. The lake drains a 250-square-mile watershed receiving 66,000 acre-feet of water from this watershed. Water is also received from the Bear River.

The lake level can be made to fluctuate 21.5 feet, but the yearly average is 3.5.

The Utah sucker is the dominant fish by weight while number wise the Bonneville cisco is dominant. Fish by weight dominance in descending order of priority follows: Bonneville whitefish, Bear Lake whitefish, carp, Utah chub, Bonneville cisco, sculpin, cutthroat trout, carrington dace, rainbow trout, and lake trout. Other species found in very small numbers are the Rocky Mountain whitefish, kokanee, yellowstone cutthroat, Kamloops trout, brown trout, yellow perch, and green sunfish. The cisco and certain species of whitefish are unique and found nowhere else.

The rapidly increasing number of summer homes and the continual expanding recreational activity around Bear Lake will continue to increase the organic nutrient content of the lake causing accelerated aging. The aging is further complicated as Bear Lake is not allowed to function as a lake but as a storage reservoir.

Fishing is centered on cutthroat trout, lake trout and Bonneville cisco. Cutthroat trout are taken mainly by trolling boat fishermen, as are the lake trout. Lake trout trolling is usually at deeper depths. The Bonneville cisco is taken mainly by dip nets during December and January.

Blackfoot Reservoir

The Blackfoot Reservoir is dominated by the Utah chub, carp and sucker but it still provides some excellent rainbow trout and cutthroat trout fishing. At one time it was also noted for its rainbow-hybrid-cutthroat trout fishing. Dace, redbside shiner also occur with brook trout as a rarity. The reservoir is almost 19,000 surface acres at full water level.

During the mid-1961's, the reservoir fishery was eradicated with toxaphene and restocked with cutthroat trout and rainbow trout. The undesirable fish species soon repopulated dominating the fish species composition. The large volume of carryover water plus restrictions on type of toxicant use makes it infeasible to control present fish populations. Blackfoot Reservoir could have extreme high economic worth if the fish species composition could be controlled.

Bloomington Lake

This lake covers about 10 surface acres and through hatchery stocking provides cutthroat trout fishing. All fishery is from shore as fishing from boats or rafts is prohibited.

Chesterfield Reservoir

This reservoir is now dominated by the Utah chub and during the past few years the reservoir drawdown has not been low enough to allow feasible eradication of the present fish population. Still the reservoir provides some excellent trout fishing. If species composition could be annually controlled it would be a very important fishery. The reservoir is stocked annually with catchable size rainbow trout. The redbside shiner population is also high in numbers.

Grays Lake

This lake provides no fishery because of water drawdown, shallow depths and stagnant water. The redbside shiner and dace make up most of the species able to survive in its marshy type environment. At certain localized spots at mouths of some of the cooler tributaries a small area trout fishery may develop.

Palisades Reservoir

This reservoir impounds about 20 miles of waters of the South Fork Snake River. The reservoir is from $\frac{1}{4}$ to 2 miles wide and covers about 16,000 surface acres when full (water level 5600 feet). The main fishery

is for cutthroat trout and brown trout. Both species are taken in the shore and troll fisheries.

Twenty-four Mile Reservoir

This reservoir has just been eradicated (1974) of its non-game fish population and will provide excellent fishing until the non-game fish population build to dominate the salmonids. At times there is a sportsman access problem because private landowners can control some access.

Montpelier Creek Reservoir

Montpelier Creek Reservoir is a multipurpose water storage facility for flood control and irrigation. The facility stores 4,050 acre-feet of which 3,840 acre-feet are available for irrigation. Two hundred and ten acre-feet are reserved for sediment storage. The constructing organizations offered a conservation pool for monetary consideration, but this opportunity was not taken by the conservation agency. Therefore, this productive reservoir can be drained on any low water year.

The dam is 82 feet high at the fill crest, with the fill dam 880 feet long. The dam backs water over 130 surface-acres at full pool about 1 mile up Montpelier Creek.

The reservoir has been stocked annually with cutthroat trout and rainbow trout and provides excellent fishing. This water is one of the most heavily used waters for fishing in the Montpelier area.

HYDROCHEMISTRY

Sufficient hydrochemistry information has been collected in conjunction with fishery studies only in Angus, Kendall, Mill, and Diamond Creeks and a small section of the Blackfoot River. The 1973 and 1974 information has not been compiled and analyzed but will appear in a later report to companion this report. The only information compiled to date is on Angus Creek which is a fairly typical south-east Idaho stream.

Angus Creek

Angus Creek is in a natural state except for overall livestock influence and mining stress still restricted in the headwaters. The upstream half of Angus Creek is a very productive (fishery) stream with total solids averaging about 250 ppm.

The water additive averages listed in table 5 do not include the 1973 and 1974 information but it is doubtful there will be much change when all the information is combined.

The two most important pollutants received by Angus Creek from past land uses are turbidity and bedload sediment. Turbidity averaged 22 JTU with a 90 percent confidence range of 19 to 25 JTU. Sampling has been done in all months except November through March when turbidity would tend to naturally be the lowest. Turbidity during sampling has never exceeded 100 JTU except under influences from past mining operations.

Total nitrogen (2.9 ppm with a 90 percent confidence interval of 2.5 to 3.3) and phosphate are high, but appear to be natural. Total solids (244 ± 14 ppm) and total dissolved solids (200 ± 12 ppm) are also high and demonstrate the fertility and high amounts of water additives. Iron ($0.120 \pm .04$ ppm), copper ($< .002 \pm .0006$ ppm), lead ($< .010 \pm 0$ ppm), flouride ($< 0.010 \pm 0$ ppm), mercury ($.001 \pm 0$ ppm), are well below the maximum allowable units

Table 7. Means and confidence intervals for selected water additives in the Angus Creek and Blackfoot River drainages (1971-1973).

Test	\bar{X}	t 90%	CI
			90%
Total N	2.9	1.66	.4
Total P	.340	1.66	.1
TS	244	1.66	14
TDS	200	1.66	12
FE	.12	1.66	.04
ALKA	156	1.68	5
Hard	100	1.67	10
Na	3.3	1.69	.1
NO ₂	<.001	2.01	0
NO ₃	.2	2.01	.1
MN	.06	2.35	.05
Cl	12	2.35	1.5
F	<.01	2.35	0
Cu	<.002	1.86	.0006
PO	.21	2.35	.04
SO ₄	3	2.01	.3
Pb ₄	<.01	2.01	0
Hg	.001	2.01	.0008

MACROINVERTEBRATES

Macroinvertebrate information has not been analyzed and will appear later in Progress Report IV of the Phosphate Aquatic Studies.

FISH POPULATIONS

Fishing pressure is moderate to intense in the higher quality streams. The lower rated streams (1-2) are seldom used. Fishing intensity occurs mainly from June through September, during low water flows. Peak stream flows normally occur during mid April to early May as the snow melts. During this period fishing intensity diverts to the lakes or reservoirs. Fish species present with abundance rating appears in Table 8.

Each stream is classified as to fishing quality (Table 5 and Appendix A) and fish species location (Table 9 and Appendix B). Fish collection completed in the study area is summarized in tables 19 through 44. Fish by class appears in Appendix D. Only those streams with actual fish collection information will be discussed directly. The other streams will be treated in the general area descriptions.

Table 8 List of fish species present in the regional phosphate team study area with distribution and population abundance rating.

Common Name	Scientific Name	Distribution and Population Rating		
		Abundant	Common	Low
Carp	<u>Cyprinus carpio</u> Linnaeus	X		
Chub, Utah	<u>Gila atraria</u> (Girard)	X		
Cisco (Bonneville)	<u>Prosopium gemiferum</u> (Snyder)			X
Dace	<u>Rhinichthys</u> spp		X	
Green sunfish	<u>Lepomis cyanellus</u> (Rafinesque)			X
Perch, Yellow	<u>Perca falvenscens</u> (Mitchell)			X
Sculpin	<u>Cottus</u> spp		X	
Shiner, Redside	<u>Richardsonius balteatus</u> (Richardson)		X	
Sucker, Longnose	<u>Catostomus catostomus</u> (Forester)		X	
Sucker, Mountain	<u>Pantosteus platyrhynchus</u> (Cope)		X	
Sucker, Utah	<u>Catostomus ardens</u> Jordan & Gilbert	X		
Trout, Brook	<u>Salvelinus fontinalis</u> (Mitchell)		X	
Trout, Brown	<u>Salmo trutta</u> (Linnaeus)			X
Trout, Cutthroat	<u>Salmo clarki</u> Richardson	X		
Trout, Lake	<u>Salvelinus namaycush</u> (Walbaum)			X
Trout, Rainbow	<u>Salmo gairdneri</u> Richardson	X		
Whitefish, (Bearlake)	<u>Prosopium abyssi</u> (Mitchell)			X
Whitefish, (Bonneville)	<u>Prosopium spilonotus</u> (Snyder)			X
Whitefish, Mountain	<u>Prosopium williamsoni</u> (Girard)		X	

Table 9 Numbering code for streams within the phosphate planning unit with fish species.

	Rainbow Trout	Brook Trout	Brown Trout	Cutthroat Trout	Snake R. Var Cutthroat
999 Swan Lake and Reservoir	999				
700 Blackfoot River	700	700		700	
602 Crow (From C to 2.5 miles downstream no fisheries)			602 A-B	602 A-C	602 A-C
601 Diamond		601 A-B		601 A-C 601 D-E	
600 Lanes				600	
514 Montpelier	514 C-E	514 B-D		514 A-E	
513 Preuss				513	
512 Tygee			512 A-B	512 A-C	512 A-C
511 Gravel		511			
510 White Dugway			510 A-C	510 A-D	510 A-B
508 Wells Canyon (No fisheries over most of area)				508 A-C	508 B-D
507 Deer		507 D-E	507 C-E	507 B-E	507 A-E
506 Slug		506 A-B		506 A-C	
500 Angus				500	
466 South Fork Timber				466	
465 Webster Canyon				465 B-C	465 A-C
464 Roberts					464
463 Browns Canyon				463	
462 No Name				462	
461 Chippy				461	
456 Beaver Dam (No fisheries from A to B)				456 B-C	456 B-C
454 Clear				454	454
452 Warm			452 A-B	452 A-C	452 A-B

Table 9 Numbering code for streams within the phosphate planning unit, cont'd.

	Rainbow Trout	Brook Trout	Brown Trout	Cutthroat Trout	Snake R. Var Cutthroat
450 Georgetown	450 C-D	450 B-D		450 A-D	
448 Left Fork Georgetown Can.	448 B-C	448 B-C		448 B-C	
443 South Fork Deer				443	443
442 Dunns				442	
429 North Fork Deer				429 B-C	429 A-C
427 South Fork Sage			427 B-C	427 B-D	427 B-C
424 Sage (Probably no fisheries from A-D)			424 C-D?	424 A-F?	424 B-D?
420 Goodheart		420		420	
419 Stewart Canyon				419	
418 Dry Valley				418	
417 Pole Canyon				417B-C	417 A-C
414 Timber				414	
413 Bear Canyon				413	
412 Coyote				412	
411 Hornet Canyon				411	
409 Mabie				409	
408 Kendall Canyon				408	
407 Mosquito				407	
406 Timothy				406	
404 Bacon				404	
401 Sheep				401	
400 Daves				400	

Table 9 Numbering code for streams within the phosphate planning unit, cont'd. . .

	Rainbow Trout	Brook Trout	Brown Trout	Cutthroat Trout	Snake R. Var Cutthroat
309 Books				309	
308 Camel Hollow				308	
307 Yellow Jacket				307	
306 Cabin				306	
305 No Name				305	305
304 Draney					304
303 Dry Fork Draney					303
302 Corrailsen				302	
301 No Name				301	
300 Olsen				300A-D	
202 No Name					202
201 No Name					201
200 No Name				200	

By Fish Species

Cutthroat trout

Cutthroat trout dominate the resident fishery. This is somewhat unique as in most areas of Idaho the cutthroat trout is on the way out because of pollution, over fishing, and replacement by stocked hatchery species. However, cutthroat trout have undergone distribution, population numbers, and racial changes.

The Snake River cutthroat trout and the Utah cutthroat trout have been replaced in many environments by the Henrys Lake cutthroat because of species eradication and hatchery stocking programs. The Snake River variety still hangs on in the Salt River drainage and some in the South Fork Snake River. The Utah cutthroat trout may no longer exist.

Cutthroat trout have also been replaced due to loss of environmental quality. The Bear River is a good example. Prior to the era of the white man the Bear River was undoubtedly a good cutthroat trout stream. Cutthroat trout occurred in 75 percent of the 111 waters referred to.

Rainbow trout

Rainbow trout have extended their historic range throughout the planning unit via artificial stocking. Much of the rainbow trout harvest is dependent on annual replenishment from hatchery production. Even with hatchery supplementation, rainbow trout occur in only 21 percent of the 111 waters referred to.

Lake trout

Lake trout are only found in Bear Lake and then only in small numbers. These fish are caught mainly by the boat troll fishery and the minor bank fishery where lures or bait are set with a boat. Because of its restrictive life cycle requirements this species will always have narrow distribution in the study area.

Brown trout

Brown trout are restricted mainly to the Salt River drainage. In streams like Crow Creek they are doing very well. Their distribution and numbers should increase in the study area because they have more tolerance to more mature conditions than the other species of trout. They occur in about 12 percent of the 111 waters referred to.

Brook trout

Brook trout are an exotic and have done very well. They adapt readily to the Beaver modified stream environments because of less restrictive spawning requirements. Brook trout have probably had more to do with replacement of cutthroat trout than any other species or factor other than pollution. They have expanded their range to include about 21 percent of the waters referred to.

Whitefish

Three species of whitefish occupy the area and although they are widespread throughout the area their main population is in Bear Lake. They occupy about 12 percent of the waters referred to.

Sucker

Three species of sucker occupy the study area and these species dominate areas of the larger streams, such as the Bear and Blackfoot Rivers. They appear heavily in the Bear Lake fish population and form large spawning runs in the Blackfoot Reservoir and River systems. They are trapped in the Blackfoot River and sold commercially. These fish do very well in the more degraded environments. They occurred in 16 percent of the 111 waters referred to.

Redside Shiner

This fish is widespread in the area but offers no value to the fishery. Its small size restricts its value and its large numbers makes it a competitor to trout.

Sculpin

Sculpin occur throughout the area and offer little value to the fishery. Probably their greatest depressent are beaver dams as their higher population numbers are found in riffle areas. They are an indicator of favorable energy gradients for salmonids.

Yellow Perch

The yellow perch are found mainly in the north end of Bear Lake and in part of the Bear River system. Because of spotty distribution they offer little value to the fishery.

Green Sunfish

This species occurs mainly in the mixing area between Bear Lake and the Bear River. Their low numbers and narrow distribution makes them low in fishery value within the planning unit

Dace

This genus has wide distribution but because of small size it has no fishery value. This genus is an indicator of aquatic conditions not suitable on border line for good salmonid production.

Utah Chub

The Utah chub has done very well under mass manipulation of water patterns. They usually dominate the uncontrollable fish species composition in the reservoirs. This species is very effecting in replacing trout populations. In areas where its numbers cannot be controlled, trout fisherys usually become depressed.

Carp

Carp have done exceptionally well in areas of poorer water quality. They have controlled aquatic habitats in the Bear Lake shoals, Blackfoot River and areas of the Bear River. This species has little fishery value and its presence degrades the trout fishery potential.

By Stream, Lake or Reservoir

Bear River Drainage

Bear River

The Bear River from the Wyoming border to the Cleveland Bridge is characterized by high amounts of suspended sediment and high turbidity*. The river and mainstream reservoirs usually support low fishery pressure. High fishery pressure does occur in short river segments below dams, i.e., Black Canyon Access Site, Last Chance Dam and Cove Plant. The Bear River is dominated by sucker, chub and carp but also contains rainbow trout, cutthroat trout, whitefish, sucker, dace, shiner, sunfish, perch and sculpin.

Bailey Creek

This small stream contains brook trout and other than this very little is known about it.

*Most of the Bear River information is taken from Mr. John T. Heimers, Idaho Fish & Game Department Publication, on the Bear River and Mainstem Reservoirs.

Beaver Creek (Little)

This stream is stocked with hatchery catchable size rainbow trout.

Bear Lake Canal

The canal flow at the Lifton Pumping Plant shifts the direction of flow, depending on whether the water is flowing into or out of Bear Lake. During the winter, water flows into Bear Lake from Mud Lake. This water has a temperature from 33° to 50° F. or more. The pH is from 8.1 to 8.3, the electrical conductivity about 450 microhos/cm., and water hardness about 212 ppm. When the water is being pumped out of Bear Lake into Mud Lake during the spring and summer water temperatures vary from 60° to 75° F., pH about 9.0, electrical conductivity about 650 micromhos/cm., and total hardness between 368 to 384 ppm.

The Bear Lake Canal is dominated by perch, chub, carp and sucker but also contains rainbow trout, cutthroat trout, brook trout, whitefish, dace, shiner, sunfish and sculpin.

Bloomington Creek

This stream contains hatchery rainbow trout and supports brook trout. Very little is known about this stream.

Coop Creek

This small stream contains cutthroat trout and hatchery rainbow.

Eight Mile

This stream supports brook trout, cutthroat trout, whitefish, and hatchery rainbow.

Fish Haven

This stream enters the west side of Bear Lake just north of the Utah-Idaho State line. The stream is small flowing one cfs or less at its mouth. During most of the summer and fall the stream is dry. When the stream is flowing the pH varies from 8.3 to 8.5, water temperatures from 35° to 50° F., electrical conductivity from 290 to 300 micromhos. cm., and water hardness averages about 200 ppm.

Georgetown Creek

Georgetown Creek carries an excellent trout population at this time. In the past trout populations were wiped out by mining influences. Brook trout are the dominant species followed rainbow trout with a few cutthroat trout. Georgetown Creek averages about 1000 salmonids per mile (Table 10).

Hot Springs (Bear Lake)

This flow may or may not be diverted through a swimming pool prior to diversion into the Northeast portion of Bear Lake. Water at the spring is about 118° F. and electrical conductivity 1200 micromhos/cm.

Indian Creek (Bear Lake)

This stream is small averaging about 0.25 cfs or less at its entrance to the northeast corner of Bear Lake. Winter temperatures are in the mid-thirties, while summer temperatures may reach 55° F. or more. Electrical conductivity reaches 800 micromhos/cm.

Table 10 Summary of fish numbers and species collected in the
Georgetown Creek drainage, October, 1974.

Station	Fish Species			Fish Species Observed	Total
	Rb	Ct	Br		
1 Gf	3	3	5	32	43
2 Gf	13	-	4	33	50
3 Gf	-	-	10	-	10
4 Gf	-	-	18	28	46
TOTAL	16	3	37	93	149

Ledge Creek

Ledge Creek is very small and contains brook trout.

Montpelier Creek

This stream supports cutthroat trout and brown trout and contains hatchery rainbow trout.

Paris Creek

Paris Creek dries up in the lower segment from agricultural and power diversions. The stream contains rainbow trout.

Pearl Creek

Pearl Creek is very small but supports brook trout and cutthroat trout.

Saint Charles

This stream enters the northeast corner of Bear Lake. Cutthroat trout use the stream for spawning in the spring and the lower segment is prime carp habitat in the summer. In the winter most of the stream freezes or comes over. During the summer much of the stream flow is diverted for cropland irrigation and the stream becomes low and sluggish. Water temperatures reach as high as 76° F. in the lower segment and pH ranges from 8.3 in the winter to 8.7 in the summer. Winter turbidities are near 0 ppm with summer turbidities as high as 13 ppm or more. The electrical conductivity ranges from 185 to 410 micromhos/cm. , and the water hardness is from 242 to 318 ppm. The stream is perennial and flows water the year around except under extreme irrigation demands. Summer flows are about four to eight cfs. Hatchery trout could be the dominant game fish during the summer.

Skinner Creek

This stream is a very small and supports cutthroat trout.

Snowslide Creek

Snowslide Creek contains large numbers of small size brown trout.

Spillway (Bear Lake)

The spillway from Mud Lake allows some seepage and occasional spring runoff into Bear Lake. This small amount of water attracts thousands of green sunfish into Bear Lake.

Stauffer Creek

This stream is very small but contains cutthroat trout.

Thomas Fork Creek

Cutthroat trout are the dominant game fish followed by mountain

whitefish and brook trout.

Trail Creek

Trail Creek is very small and supports brook trout.

Whiskey Creek

This stream is very small but supports brook trout and cutthroat trout and is stocked with hatchery rainbow trout.

Blackfoot River Drainage

Streams in the Blackfoot River drainage rate high when compared to other Idaho streams. Fertility is high, gradients low and hydro-chemical conditions are not too degraded. The drainage is a great producer of cutthroat trout which run the main Blackfoot River and its major tributaries to spawn.

Tables 5 and 6 contain a quick analysis of major environmental descriptors and impactors of almost all the streams, lakes, and reservoirs within the phosphate planning unit. Impacting stress applied to each stream from other resource uses are quantified. These figures can be refined as better information is obtained. Streams in the tables are listed in Alphabetical order for quick referral. Table 5 list streams that lie mainly in the Caribou National Forest phosphate land use plan area and table 6 list those streams that lie outside the Caribou unit but within the Regional planning unit. Streams are rated from one to five with the higher rating representing the higher quality stream.

Angus Creek

Angus Creek is an excellent producer of cutthroat trout, averaging about 1200 per mile. From the headwaters to the downstream end of the narrows cutthroat trout dominate. From the narrows to the mouth environmental conditions degrade and the redbside shiner, dace, and sucker dominate the fish populations.

Angus Creek Reservoir functions similar to a very large beaver dam and is now carrying a dense population of 12 inch cutthroat trout. The stream immediately below the dam is dry part of the year because the mining corporation pumps water from the reservoir causing draw-down below the outlet.

Angus Creek contains cutthroat trout, dace, redbside shiner, sculpin, and possibly rainbow trout. The size of cutthroat trout from the narrows upstream has increased because of a cutthroat trout drift from the small reservoir.

Blackfoot River

The Blackfoot River is nationally known for its large cutthroat trout. Spawning runs of cutthroat trout pass from the reservoir through the Blackfoot River to get to the tributaries to spawn. The large size cutthroat trout of the early 1960's no longer exist in past high numbers and have been replaced by a smaller cutthroat trout spawner. The lower segment of the Blackfoot River (upstream from the reservoir) is dominated by carp and suckers. Suckers run the Blackfoot River to spawn and are trapped and sold commercially.

The environmental quality of the Blackfoot River is not what it should be and may be one reason for the Blackfoot system not producing the numbers of trout it should.

The Blackfoot River contains rainbow trout, cutthroat trout, brook trout, whitefish, sucker, dace, shiner, sculpin, Utah chub and carp.

Davies Creek

Davies Creek has little to offer the fishery especially within the Forest boundary. The stream only averages about 30 salmonids per mile (Table 11). Cutthroat trout were the only species collected.

Diamond Creek

Diamond Creek is dominated by cutthroat trout; ~~Brook~~ brook trout are scattered throughout the drainage, but their main populations are in the headwaters. Diamond Creek only averages about 400 native cutthroat trout and 60 brook trout per mile (Table 12). Diamond Creek has more capability to produce fish than its present production.

Diamond Creek supports spawning runs of cutthroat trout from the Blackfoot systems. This stream, in conjunction with its tributary, Spring Creek, is probably the most important spawning tributary in the Blackfoot system. Diamond Creek contains cutthroat trout, brook trout, whitefish, sculpin, and possibly rainbow trout.

Grays Lake Outlet (Jensen Cut)

Grays Lake Outlet flows into Meadow Creek and on into the Blackfoot system. Waterflow is controlled by Indian rights which cause degrading flow regulation. The stream is a very poor fishery composed mainly of dace and reidside shiner. There are very few trout and the turbid condition of the water during most of the summer degrades the aesthetics. The only significant contribution it offers is providing attraction water in the reservoir at the mouth of Meadow Creek to congregate cutthroat trout, which at times support an excellent fishery.

Table 11 Summary of fish numbers and species collected in the
Davies Creek drainage, October, 1974.

Station	Fish Species		Br	Fish Species Observed	Total
	Rb	Ct			
	-	-	-	1	1

Table 12 Summary of fish numbers and species collected in the
Diamond Creek drainage, August, 1974.

Station	Fish Species			Fish Species		Total
	Rb	Ct	Br	Cot	Observed	
1D	-	16	14	-	15	45
2D	-	21	3	2	14	40
3D	-	10	-	1	8	19
4D	-	19	1	-	4	24
5D	-	5	-	3	3	11
6D	-	2	-	-	350	352
7D	-	15	-	-	70	85
8D	-	42	4	-	25	71
9D	-	20	-	-	15	35
M1	-	8	-	-	500	508
M2	-	-	-	-	600	600
M-1S	-	-	2	-	-	2
TOTAL	-	158	24	6	1604	1792

Kendall Creek

Kendall Creek, within the Forest Service boundaries carries a very low fish population because of poor stream structure. This area only carries 26 trout per mile (Table 13). The lower area may have a much better environment. Kendall Creek contains cutthroat trout and probably brook trout and sculpin.

Little Blackfoot River

The Little Blackfoot River is charged with CO₂ from springs. The stream has been stocked with rainbow trout but there has been no carry-over. Good fishing conditions exist in the area where the stream enters the Blackfoot Reservoir. A falls blocks migrant runs of spawning cutthroat from using the system. Brook trout may use the stream.

Olsen Creek

Olsen Creek is dominated by brook trout with a small population of cutthroat trout (Table 14). This stream in the sampling area was supporting about 3000 trout per mile. The lower segment of Olsen Creek probably supports dace and redbelly shiner.

Poison Creek

Poison Creek enters the north end of the Blackfoot Reservoir. At one time the stream supported large runs of spawning cutthroat trout but artificial blocks have been installed to stop this run. The stream still contains a few resident cutthroat and it is not stocked.

Table 13 Summary of fish numbers and species collected in the
Kendall Creek drainage, October, 1974.

Station	Fish Species		Br	Fish Species		Total
	Rb	Ct		Observed		
1K	0	0	0	0		0
2K	0	2	0	0		2
TOTAL	0	2	0	0		2

Table 14 Summary of fish numbers and species collected in the
Olson Creek drainage, October, 1974.

Station	Fish Species		Br	Fish Species		Total
	Rb	Ct		Observed		
1-OB	-		6	56	48	110

Table 15 Summary of fish numbers and species collected in the
Sheep Creek drainage, September, 1974.

Station	Fish Species		Br	Sc	Fish Species		Total
	Rb	Ct			Observed		
1S	-	62	-	1	29		92
2S	-	55	-	3	12		70
TOTAL	-	117	-	4	41		162

Table 16 Summary of fish numbers and species collected in the
Slug Creek drainage, October, 1974.

Station	Fish Species		Sc	Fish Species		Total
	Br	Dc		Observed		
1SL	16	5	8	2		31

Sheep Creek

Only cutthroat trout were collected in Sheep Creek and this dominance may result from the annual runs of spawning cutthroat trout from the Blackfoot system (Table 15). In past years this adult spawning run was composed of some very large trout, 6 to 12 pounds. These may have been primarily the native cutthroat trout. Today the spawning fish are much smaller, averaging from 2 to 5 pounds and are probably well-mixed with the Henrys Lake variety.

In the two collection areas the stream was supporting about 4000 cutthroat trout per mile. With this density Sheep Creek is probably the single most important stream in the Blackfoot system as far as fish contribution to the Blackfoot River and Reservoir. Sheep Creek contains cutthroat trout, sculpin and possibly rainbow trout.

Slug Creek

Slug Creek is dominated by brook trout (Table 16). The upper segment is a beaver dam environment and the lower segment meanders through private property with a very low channel gradient. Dace and sculpin populations are high in the lower downstream segment.

Wolverine Creek

This stream runs into the Blackfoot system. During the 1940's it was an excellent fishing stream but the once brushy stream environment has been destroyed and the stream has silted up, probably because of livestock.

Salt River Drainage

Crow Creek

Crow Creek is dominated by cutthroat trout in the upper segment and brown trout have good populations in the lower segment (Table 17). Both the Snake River and Henrys Lake variety of the cutthroat trout occur in the stream. Both species are still identifiable but undoubtedly hybridization is occurring. Crow Creek above the Forest Service boundary averages about 900 cutthroat per mile and only about 90 brown trout. Below the boundary brown trout numbers start increasing. No brook trout were found in the collection areas. This stream contains cutthroat trout, brown trout, whitefish, sucker and sculpin.

Tab13 17 Summary of fish numbers and species collected in the Crow Creek drainage, October, 1974.

Station	Rb	Fish Species Ct	Br	Brown	Sc	Fish Species Observed	Total
1CF	-	13	-	1	3	23	40
2CF	-	33	-	7	-	10	50
3CF	-	28	-	-	8	8	44
4CF	-	24	-	-	4	4	32
TOTAL	-	98	-	8	15	45	166

South Fork Snake River Drainage

Tincup Creek

Tincup Creek provides a good fishery and is stocked with small-size (fingerling) cutthroat trout and cutthroat trout fry. The North and South Forks of Tincup are almost completely dominated by beaver dams and probably contain rainbow trout, cutthroat and brook trout. Road construction has had a bad influence on the stream causing migration blocks and altered stream channels.

Snake River Drainage

Birch Creek

Dry land farming has silted up this stream and the only remaining fisheries is in the few beaver ponds remaining. These beaver dams contain trout, probably cutthroat or brook trout.

Gravel Creek

The Gravel Creek game fish population is totally brook trout. No other fish species were collected (Table 18). The lower stream area appears to have high water temperatures but the upper area does not. The stream is small but still carries about 2000 brook trout per mile in the upper segment.

Table 18 Summary of fish numbers and species collected in the Gravel Creek drainage, October, 1974.

Station	Fish Species			Fish Species Observed	Total
	Rb	Ct	Br		
1G	-	-	42	27	69

Grays Lake Outlet (North)

This stream flows into Willow Creek and supports a good fishery. The stream is stocked annually with rainbow trout. The large number of beaver dams develops good habitat for brook trout and cutthroat trout. This stream also contains brown trout, dace and redbside shiner.

Meadow Creek (Willow Creek)

This stream drains into Willow Creek and because of dry land farming it is heavily silted. The fishery is of little value.

Mill Creek (Snake Drainage)

This stream is small and stocked with young cutthroat trout.

North Canyon (Snake Drainage)

North Canyon is a small stream of little fishery value but it is stocked with young cutthroat trout. The stream also contains a small cutthroat trout population.

Portneuf

Some segments of the Portneuf River are of blue ribbon quality. The stream channel from Chesterfield Reservoir, 12 miles downstream has been altered and is nothing more than an irrigation ditch. The productivity of this segment has been killed. The river above Chesterfield is small, but in good condition. The stream is stocked with rainbow trout and in combination with the natural production of rainbow trout, cutthroat trout and brook trout, the stream provides high quality fishing. The stream, especially in the lower segment, contains reidside shiner, sucker, dace and chub. This stream has the potential of being blue ribbon quality all the way if stress from irrigation return flows, irrigation diversion, and livestock could be controlled. The stream is stocked annually with rainbow trout.

Skinner Creek (Snake Drainage)

The stream is small and has a wild cutthroat trout population. The stream is also stocked with fingerling size hatchery reared cutthroat trout.

Willow Creek

The stream is excellent fishing above Tex Creek but dominated by silt below because of dry farming. Brook trout occur in the headwaters and rainbow trout and cutthroat trout occur in the middle and lower segments. The soon-to-be constructed Rire Dam will flood this stream from the dam site upstream to Bear Creek.

AQUATIC ENVIRONMENT CHARACTERISTICS BY LANDTYPE ASSOCIATION
AND LANDTYPE (CARIBOU PLANNING UNIT)

Bottomlands

The lands in this association make up only a small percent of the total area but still provide most of the better fishery environments. The streams are more gentle, have more meandering, and have less channel gradient than the streams in other land associations. These conditions result from the gentle sloping of the valley bottom lands. Travertine formations, when they occur, modify water flows and form excellent environments. Also, travertine dams can create excellent ponds or lakes as exemplified by the Swan Lakes.

The bottomland association contains most of the larger streams in the caribou unit with the fifth and sixth order streams contributing 173 stream miles. Examples of streams in this association are Crow, Diamond, Slug, Angus, and the Blackfoot.

Streamside vegetation is composed mainly of grass with some willow and sagebrush. The streamside environments are usually degraded because of overuse by livestock. Rest-rotation management systems are also causing physical streamside damage. Streambanks are fragile because of their formation from loose depositional material. The gentle gradient, low banks and shallow stream depths allow livestock to traverse most the streamside area.

The streamside environment needs intensive management in all

landtypes within this association to prevent thermal pollution, loss of incoming organic energy, and streambank instability. Roads should not encroach on these streams because of their high fishery value.

Toeslope-Timbered (11)

These slope lands occur at the valley edge and therefore main streams usually just intercept them. Most streams in toeslope lands offer little value to the fishery.

Toeslope-Non timbered (12)

This landform occupies the valley floor position below high ridges. Except for Upper Angus Creek this landtype contains little aquatic environment of any fishery value.

Alluvial-Wet and Overflow (14)

These streams have low channel gradient because slopes only vary from 0 to 3 percent. This landtype makes up only 0.6 percent of the planning unit but has the most valuable fisheries in the study area. These lands are flooded during high water flows, which makes stream banks even more susceptible to physical damage from livestock or mining operations. These areas need to be red-flagged for special consideration. Beaver have modified the water structure, often providing excellent wildlife and fisheries environments. Stream areas typical of the flat, valley bottomland would be portions of Crow and Diamond Creeks.

Dry Alluvial (15)

Streams in dry alluvial lands have slightly higher channel gradients than wet alluvial lands and streambanks are not quite so

fragile. This landtype also contributes a small percent of the area but contains valuable fishery environments. At the present time, livestock are the most degrading influence.

The streamside environment is dominated by grass, willow and sagebrush. Beaver have modified some of the water environment.

Alluvial Fans (16)

Streams crossing the mouths of the larger Canyons pass through these lands, but they offer no outstanding habitat value. In other land areas where glaciers have deposited large fans, crossing stream areas can be very important.

Sideslope Association

The sideslope association contains small tributary streams adjacent to larger valleys. A few larger streams, such as Angus Creek border on this association but usually the streams are small and have little onsite fishery value. Most of the streams are small and ephemeral and only a small percent exceed stream order 3.

Weakly Dissected Valley Sideslopes-Timbered

This landtype borders two of the larger streams meandering through the lower lying bottomlands. Within these lands there is little fishery value, but degradation of these streams would effect the higher quality streams they feed into. Usually, the slopes (30-50%) are too steep for much beaver modification of the water environment.

Moderately Dissected Valley Sideslopes-Timbered (31-1)

Stream interpretations are about the same as landtype 31 except streams are receiving less influence from livestock.

Moderately Dissected Valley Sideslopes-Nontimbered (32)

The same stream interpretation as for landtype 31 except possibly more livestock influence.

Mature Low Relief Valley Sideslopes (33)

The same interpretation as landtype 31.

Smooth Escarpments-Low Relief and Elevation (41)

The streams are mainly ephemeral and have low fishery values. Like other valley sideslopes, polluting elements would be transferred to valley bottom streams.

Dissected Escarpments-High Relief and Elevation (44)

No fishery values.

Dissected Bench Escarpments-High Relief (42)

These streams have little fishery value because streams are mainly ephemeral.

Steep Canyon Sideslopes-Timbered, Low Relief (45)

Canyon Land streams are mainly ephemeral and most of these streams drain into the Bear River. However segments of the two most productive fishery streams, the Blackfoot River narrows and Georgetown Creek, border this landtype. The remainder of the streams have little fishery value.

Steep Canyon Sideslopes-Nontimbered (45-1)

This landtype has the same interpretation as landtype 45.

Steep Canyon Sideslopes-Shaly North Facing (46)

This landtype has the same interpretation as landtype 45.

Steep Canyon Sideslopes-Shaly South Facing (46-1)

This landtype has the same interpretation as landtype 45.

Uplands

This is the largest land association but except for Sheep and Upper Georgetown Creeks, streams are of little value to the fishery. Only a very small percent of the streams are 4th order or higher.

Faulted Mountain Slopes (51)

Streams have slight fishery value and are mainly ephemeral.

Smooth Mature Fluvial Lands-Low Relief Timbered (52)

These streams have the same interpretation as those for landtype 51.

Low Relief Mature Fluvial Lands-Nontimbered (52-1)

Streams in this landtype have the same interpretation as for landtype 51.

Dissected Scarp and Dip Slope Land-Mixed open and Timbered (53)

Part of Sheep Creek runs through this landtype which is an excellent cutthroat trout spawning stream. Other than sheep Creek this landtype has little to offer the fisheries.

Dissected Broken Fluvial Lands-Nontimbered (53-2)

Georgetown Creek has a high salmonid population and flows through this landtype. Other than Georgetown Creek, this landtype contains little fishery value because streams are too small and steep.

Headlands-Steep Short Slopes, Sharp Ridges, on Short Drainages (54)

This landtype has low fishery value because it includes only headwaters of major stream systems.

Broken Mountain Slope-Steep and Timbered (55)

This landtype borders small streams such as South Sage, Main Sage, and Timothy Creeks. Streams within these lands have low onsite value to the fishery.

Weakly Dissected Broken Scarp, Slopes-South Facing (56)

These lands have the same interpretation as for landtype 55.

Weakly Dissected Broken Scarp Slopes-North Facing (56-1)

These lands border some of the small streams which have low onsite fishery value.

Foothills Association

Low Foothills-Nontimbered (71-2)

Other than for beaver dams this landtype has low onsite fishery values.

Smooth Foothills-Mixed Aspen and Open (71-3)

These streams have the same interpretation as for landtype 71-2.

Dissected Foothills Nontimbered (71-4)

These streams have the same interpretation as for landtype 71-2.

Ridgeland Association

Smooth Ridgeland-High Elevation (2)

These streams have no onsite fishery values.

Dissected Ridgeland-High Elevation (2-1)

These streams have no onsite fishery values.

Potential Fisheries Mitigation

It is very difficult, without adequate field time or analysis to prepare a chapter on fisheries mitigation. Because fishery mitigation is required in this report it is presented. It should be evaluated with the understanding there is very little field study and no data base for analysis. The main reason for presenting this weak mitigation summary is to provide a general idea of what potential may be available for fishery mitigation. With intensive study by a fishery biologist a valid mitigation package could be presented. Potential fishery mitigation sites are discussed individually.

Wade Properties (Key 1)

The Wade properties includes about 300 acres of valley lands encompassing Crow Creek above and below the confluence of Manning Creek. The area is surrounded by Forest Service Property. About one mile of Crow Creek meanders through this property. In past years water has been diverted out of Crow Creek to irrigate the pasture lands. This diversion not only takes water away from the stream but return water flows are lower in quality.

Purchase of these lands would provide continued access to the Crow Creek fishery, stop onsite stream diversion, provide camping areas and provide relief from overgrazing on the Crow Creek streambanks.

The lands are classified as alienated lands and purchase or exchange would be easier than the upstream private lands which are considered as outside the Forest Service boundaries.

Crow Creek contains the Henrys Lake and Snake River varieties of the cutthroat trout and brown trout which support a good fishery. Crow Creek under proper management could be a more productive stream, fishery wise.

Angus Creek Impoundment (Key-2)

This proposed dam site would be in the Angus Creek narrows. The upper Angus Creek reservoir has already demonstrated that Angus Creek waters with sufficient depth produce excellent fisheries. At one time, this impoundment was proposed to catch potential sediment, should it be released from upstream mining operations.

The size of the lake would depend on feasible dam height. A loss of a migrant cutthroat trout spawning area would occur but this loss would be minor compared to potential benefits..

Ephraim Valley (Key-3)

An impoundment in Ephraim Valley could provide an excellent fishery due to the morphology of the basin. The stream presently contains cutthroat trout and brown trout. If adequate water and dam site was available this area could have excellent recreation potential.

Reservoir Acquisition (Key-4)

A private fishing reservoir now exists on this site but the public is excluded because it is on private ground. Possibly this reservoir would be of more value if purchased and opened to the public.

Wooley Valley Ponds (Key-5)

These ponds are on private land that is intensively grazed. The area lends itself to conversion to an excellent wildlife and fisheries area because the surface water is close to ground level. This area could provide excellent potential for marsh and pond development.

Because subsurface waters are near the surface this area has excellent possibilities for water orientated recreation.

Diamond Creek Valley Excavation (Key-6)

If proposed mining excavates large trenches in this area its possible with subsurface water flows or diversion of surface waters that artificia

Diamond Creek Valley Excavations (Key-7)

If proposed mining excavates large trenches in this area its possible with subsurface water flows or diversion of surface waters that artificial lakes could be created.

Spring Creek Spawning Enhancement (Key-8)

Spring Creek is probably the most valuable cutthroat trout spawning stream in the Blackfoot system. Because this stream heads and ends on private lands its environmental status could be in jeopardy. Present livestock influence in the streamside environment and stream channel are severe.

If this stream was placed in public ownership and fenced for protection this spawning stream would always offer prime habitat for the migrant cutthroat trout from the Blackfoot system.

Diamond Creek Valley Excavations (Key-9)

If proposed mining excavates large trenches in this area its possible with subsurface water flows or diversions of surface waters that artificial lakes could be created.

Upper Crow Creek Reservoir Site (Key-10)

A reservoir once functioned at this site but was breached because of leakage problems in the dam. This site could be evaluated to determine if it has any fishery value to warrant rebuilding the dam.

Georgetown Creek Stream Improvement (Key-11)

Sections of Georgetown Creek have been altered by mill construction and mine and mill road access. Some of these stream sections may be suitable for environmental enhancement. Some of the road culvert crossings could possibly be re-worked to form large in-stream pools.

Blackfoot Narrows Impoundment (Key-12)

The Blackfoot Narrows may provide an excellent dam site to form a lake over portions of the Blackfoot valley. With the abundance of high quality water this artificial lake could be the most valuable fishery within the planning unit.

Grays Lake (Key-13)

Grays Lake has always suffered from lack of sufficient water. It's possible with some study that there may be ways of enhancing this refuge for both fisheries and wildlife.

Blackfoot River Public Access (Key-14)

Most of the Blackfoot River is on private land and some fishing access is

restricted and this could become much more restricted in the future. Either through access leases or purchase of streamside lands the more important stream areas could be opened to the public for fishing and hunting.

Slug Creek Spring Management for Spawning (Key-15)

Springs occur in this area that are very important for trout spawning, mainly brook trout. Because these springs occur on private land, future wildlife and fishery management may be difficult. A study would determine if there is a need in this area for any type of enhancement or acquisition.

Diamond Creek Streamside Management (Key-16)

The complete Diamond Creek streamside environment has been changed by livestock activities. Stream sections may need fenced or livestock management systems may need to be altered.

CONCLUSIONS

1. Past and present land uses have degraded valuable portions of the aquatic environment in most of the major drainages.
2. This aquatic environment and fishery information is only a beginning and will not meet the intensity needed for comprehensive land use planning.

RECOMMENDATIONS

1. Include objectives and goals in the land use plan that will provide direction and priority for land managers to correct the past, present and future pollution and encroachment factors affecting the aquatic environment and its fisheries.
2. Continue to conduct fishery-aquatic studies so the necessary information will be available for the second approximation leading to a comprehensive land use plan.

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Appendix A

Stream Classification

(Located in back packet)

Appendix B

LOCATION OF FISH SPECIES

(Located in back packet)

Appendix C
FISH MITIGATION SITES
(Located in back packet)

Appendix D:

Summaries of electro fish collections by stream

<u>Stream</u>	<u>Page(s)</u>
Diamond Creek	65 to 75
Stewart Creek	76
Georgetown Creek	77 to 81
Sheep Creek	82 to 83
Slug Creek	84
Olson Creek	85
Crow Creek	86 to 89
Gravel Creek	90
Davies Creek	91
Kendall Creek	91

Table 19 Summary of fish numbers, fish species and (collected fish only) size for station 1D in the Diamond Creek drainage, August, 1974.

Size class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
2.4	-	-	1	-	1
2.8	-	1	2	-	3
3.0	-	2	-	-	2
3.2	-	3	2	-	5
3.4	-	2	1	-	3
3.6	-	1	-	-	1
3.8	-	1	1	-	2
4.0	-	1	-	-	1
4.4	-	1	-	-	1
4.8	-	-	1	-	1
5.0	-	2	1	-	3
5.2	-	-	1	-	1
5.8	-	2	-	-	2
6.0	-	-	2	-	2
6.8	-	-	1	-	1
8.0	-	-	1	-	1
	-	16	14	-	30

15 trout observed

Sample length 200 feet

Table 20 Summary of fish numbers, fish species and (collected fish only) size for station 2D in the Diamond Creek drainage, August, 1974.

Size class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
2.4	-	-	-	1	1
2.6	-	-	-	1	1
3.6	-	1	-	-	1
3.8	-	2	-	-	2
4.2	-	2	-	-	2
4.4	-	1	-	-	1
4.8	-	3	-	-	3
5.2	-	2	-	-	2
5.4	-	1	-	-	1
5.6	-	2	1	-	3
5.8	-	1	-	-	1
6.0	-	2	-	-	2
6.4	-	2	-	-	2
6.6	-	1	-	-	1
7.0	-	-	1	-	1
7.6	-	1	-	-	1
7.8	-	-	1	-	1
	-	21	3	2	26

14 trout observed

Sample length 200 feet

Table 21 Summary of fish numbers, fish species and (collected fish only) size for station 3D in the Diamond Creek drainage, August, 1974.

Size class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
2.4	-	-	-	1	1
3.8	-	1	-	-	1
4.0	-	1	-	-	1
4.6	-	1	-	-	1
5.6	-	1	-	-	1
6.4	-	2	-	-	2
7.0	-	1	-	-	1
7.4	-	1	-	-	1
8.7	-	1	-	-	1
10.1	-	1	-	-	1
	-	10	-	1	11

8 cutthroat trout observed

Sample length 200 feet

Table 22 Summary of fish numbers, fish species and (collected fish only) size for station 4D in the Diamond Creek drainage, August, 1974.

Size class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
3.6	-	1	-	-	1
3.8	-	2	-	-	2
4.0	-	2	-	-	2
4.2	-	2	-	-	2
4.4	-	1	-	-	1
4.8	-	1	-	-	1
5.0	-	3	-	-	3
5.2	-	1	-	-	1
5.6	-	1	-	-	1
5.8	-	2	-	-	2
6.0	-	2	-	-	2
7.4	-	1	-	-	1
12.1	-	-	1	-	1
	-	19	1	-	20

4 cutthroat trout observed

Sample length 200 feet

Table 23 Summary of fish numbers, fish species and (collected fish only) size for station 5D in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
2.0	-	-	-	1	1
3.2	-	-	-	2	2
3.4	-	1	-	-	1
3.8	-	1	-	-	1
5.8	-	1	-	-	1
6.0	-	1	-	-	1
7.2	-	1	-	-	1
	-	5	-	3	8

3 cutthroat trout observed

Sample length 200 feet

Table 24 Summary of fish numbers, fish species and (collected fish only) size for station 6D in the Diamond Creek drainage, August, 1974.

Size class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
4.6	-	1	-	-	1
5.0	-	1	-	-	1
	-	2	-	-	2

An estimated 350 cutthroat trout fry of hatchery origin observed
This stream section later dried up
Sample length 200 feet

Table 25 Summary of fish numbers, fish species and (collected fish only) size for station 7D in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
1.2	-	1	-	-	1
3.2	-	1	-	-	1
3.6	-	1	-	-	1
3.8	-	3	-	-	3
4.0	-	3	-	-	3
4.2	-	2	-	-	2
4.4	-	2	-	-	2
5.0	-	1	-	-	1
6.0	-	1	-	-	1
	-	15	-	-	15

70 young of the year cutthroat trout observed about 1.1 average total length

Sample length 200 feet

Table 26 Summary of fish numbers, fish species and (collected fish only) size for station 8D in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
1.4	-	1	-	-	1
1.6	-	1	-	-	1
1.8	-	2	-	-	2
2.0	-	2	-	-	2
2.8	-	1	-	-	1
3.0	-	3	-	-	3
3.2	-	2	-	-	2
3.4	-	7	-	-	7
3.6	-	5	-	-	5
3.8	-	3	-	-	3
4.0	-	5	-	-	5
4.2	-	2	-	-	2
4.4	-	3	-	-	3
4.6	-	1	-	-	1
5.6	-	1	-	-	1
6.0	-	2	-	-	2
7.0	-	1	-	-	1
7.8	-	-	1	-	1
8.3	-	-	1	-	1
8.5	-	-	1	-	1
9.3	-	-	1	-	1
	-	42	4	-	46

25 young of the year cutthroat trout observed averaging about 1.2 inches

Sample length 200 feet

Table 27 Summary of fish numbers, fish species and (collected fish only) size for station 9D in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
1.6	-	1	-	-	1
2.0	-	1	-	-	1
3.6	-	2	-	-	2
3.8	-	3	-	-	3
4.0	-	3	-	-	3
4.2	-	1	-	-	1
4.6	-	1	-	-	1
4.8	-	1	-	-	1
5.0	-	1	-	-	1
5.2	-	3	-	-	3
5.4	-	1	-	-	1
6.2	-	1	-	-	1
7.2	-	1	-	-	1
	-	20	-	-	20

15 young of the year cutthroat trout observed
Sample length 200 feet

Table 28 Summary of fish numbers, fish species and (collected fish only) size for station M1 in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
1.6	-	2	-	-	2
3.4	-	1	-	-	1
3.8	-	1	-	-	1
4.6	-	1	-	-	1
4.8	-	1	-	-	1
5.2	-	1	-	-	1
5.8	-	1	-	-	1
	-	8	-	-	8

An estimated 500 hatchery cutthroat trout fry observed averaging between 1.1 and 1.6 inches.

This station is 500 feet in length starting at the confluence of Stewart Creek and ending 500 feet downstream Diamond Creek

Table 29 Summary of fish numbers, fish species and (collected fish only) size for station M2 in the Diamond Creek drainage, August, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
-	-	-	-	-	-
None Collected					

An estimated 600 hatchery cutthroat fry observed averaging about 1.1 to 1.6 inches in total length.

Station begins at confluence of Stewart Creek and ends 500 feet upstream in Diamond Creek.

Table 30 Summary of fish numbers, fish species and (collected fish only) size for station M-1S in the Stewart Creek, August 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Cot	
4.4	-	1	-	-	1
4.8	-	1	-	-	1
	-	2	-	-	2

This station starts at the mouth of Stewart Creek and proceeds up Stewart Creek ending 500 feet upstream.

Table 31 Summary of fish numbers, fish species and (collected fish only) size for station 1 Gf in the Georgetown Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
3.0	-	1	-	1
5.4	-	-	1	1
6.6	-	1	1	2
6.8	-	1	-	1
7.2	-	-	1	1
7.4	-	-	1	1
8.5	-	-	1	1
8.7	1	-	-	1
8.9	1	-	-	1
12.3	1	-	-	1
	3	3	5	11

Observed 32 salmonids of which 7 were brook trout, 2 of the rainbow were known hatchery products

Sample length 200 feet

Table 32 Summary of fish numbers, fish species and (collected fish only) size for station 2 Gf in the Georgetown Creek drainage, October, 1974.

Size Class inches	Fish Species		Total
	Rb	Br	
6.6	1	-	1
7.4	1	-	1
7.6	1	-	1
7.8	1	-	1
8.1	1	-	1
8.7	2	2	4
8.9	-	1	1
9.1	1	-	1
9.3	1	-	1
9.9	-	1	1
10.1	1	-	1
10.3	1	-	1
10.7	1	-	1
11.1	1	-	1
	13	4	17

Table 33 Summary of fish numbers, fish species and (collected fish only) size for station 3 Gf in the Georgetown Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
3.4	-	-	1	1
4.2	-	-	1	1
4.4	-	-	2	2
4.8	-	-	1	1
5.2	-	-	2	2
5.8	-	-	1	1
6.0	-	-	1	1
8.0	-	-	1	1
	-	-	10	10

No hatchery stocked fish collected
7 brook trout were observed

Table 34 Summary of fish numbers, fish species and (collected fish only) size for station 4 Gf in the Georgetown Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
3.6	-	-	1	1
4.2	-	-	1	1
4.4	-	-	1	1
5.2	-	-	1	1
5.6	-	-	1	1
5.8	-	-	1	1
6.4	-	-	1	1
6.8	-	-	4	4
7.0	-	-	4	4
7.4	-	-	1	1
7.6	-	-	1	1
7.8	-	-	1	1
	-	-	18	18

28 brook trout observed

Table 35 Summary of fish numbers, fish species and (collected fish only) size for station 1S in the Sheep Creek drainage, September, 1974.

Size Class inches	Fish Species				Total
	Rb	Ct	Br	Sc	
1.6	-	1	-	-	1
1.8	-	3	-	-	3
2.0	-	7	-	-	7
2.2	-	6	-	-	6
2.4	-	1	-	-	1
2.6	-	1	-	-	1
3.4	-	-	-	1	1
3.6	-	1	-	-	1
3.8	-	6	-	-	6
4.0	-	10	-	-	10
4.2	-	5	-	-	5
4.4	-	2	-	-	2
4.6	-	1	-	-	1
4.8	-	1	-	-	1
5.0	-	2	-	-	2
5.2	-	1	-	-	1
5.6	-	1	-	-	1
5.8	-	3	-	-	3
6.0	-	1	-	-	1
6.4	-	1	-	-	1
7.0	-	2	-	-	2
7.2	-	1	-	-	1
7.4	-	1	-	-	1
7.6	-	1	-	-	1
7.8	-	1	-	-	1
8.0	-	1	-	-	1
8.1	-	1	-	-	1
	-	62	-	1	63

29 cutthroat trout observed

Sample length 200 feet

Table 36 Summary of fish numbers, fish species and (collected fish only) size for station 2S in the Sheep Creek drainage, September, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Sc	
1.4	-	1	-	1
1.6	-	1	-	1
1.8	-	7	-	7
2.0	-	14	-	14
2.2	-	10	-	10
2.4	-	6	-	6
2.6	-	6	-	6
2.8	-	4	-	4
3.8	-	1	-	1
4.0	-	2	1	3
4.2	-	-	1	1
4.6	-	1	1	2
4.8	-	1	-	1
6.2	-	1	-	1
	-	55	3	58

12 cutthroat trout observed

Sample length 200 feet

Table 38 Summary of fish numbers, fish species and fish size for electro collected fish in the Olsen Creek drainage, October 1974. (Station 10F).

Size Class inches	Rb	Fish Species		Total
		Ct	Br	
2.0	-	2	-	2
2.4	-	1	-	1
2.6	-	-	2	2
2.8	-	-	3	3
3.0	-	-	4	4
3.2	-	-	6	6
3.4	-	-	1	1
3.6	-	-	3	3
3.8	-	-	1	1
4.2	-	-	2	2
4.4	-	-	1	1
4.6	-	-	1	1
4.8	-	1	6	7
5.0	-	-	8	8
5.2	-	-	3	3
5.4	-	-	2	2
5.6	-	-	5	5
5.8	-	-	1	1
6.0	-	-	2	2
6.6	-	1	-	1
6.8	-	1	3	4
7.0	-	-	2	2
	-	6	56	62

48 brook trout observed
Sample length 200 feet

Table 39 Summary of fish numbers, fish species and (collected fish only) size for station 1CF in the Crow Creek drainage, October, 1974.

Size Class inches	Fish Species					Total
	Rb	Ct	Br	Brown	Sc	
3.0	-	2	-	-	1	3
3.2	-	-	-	-	2	2
4.2	-	1	-	-	-	1
4.4	-	1	-	-	-	1
5.0	-	1	-	-	-	1
5.2	-	1	-	-	-	1
5.6	-	1	-	-	-	1
5.8	-	1	-	-	-	1
6.0	-	1	-	-	-	1
7.4	-	1	-	-	-	1
7.8	-	2	-	-	-	2
8.7	-	1	-	1	-	2
	-	13	-	1	3	17

23 cutthroat observed

9 identified Snake River variety

3 " Henrys Lake "

Sample length 200 feet

Table 40 Summary of fish numbers, fish species and (collected fish only) size for station 2CF in the Crow Creek drainage, October, 1974.

Size Class inches	Fish Species					Total
	Rb	Ct	Br	Brown	Sc	
2.4	-	1	-	-	-	1
2.6	-	-	-	-	-	2
2.8	-	-	-	-	-	1
3.0	-	-	-	-	-	2
3.2	-	-	-	-	-	2
4.0	-	3	-	-	-	3
4.2	-	2	-	-	-	2
4.4	-	4	-	-	-	4
4.6	-	1	-	-	-	1
4.8	-	3	-	-	-	3
5.0	-	1	-	-	-	1
5.2	-	1	-	-	-	1
5.4	-	2	-	-	-	2
5.8	-	1	-	-	-	1
6.8	-	2	-	-	-	2
7.0	-	3	-	-	-	3
7.4	-	2	-	-	-	2
7.8	-	2	-	-	-	2
8.7	-	2	-	-	-	2
8.9	-	1	-	-	-	1
9.3	-	1	-	-	-	1
10.1	-	1	-	-	-	1
	-	33	-	-	7	40

6 cutthroat trout and 4 sculpin observed

16 Snake River variety cutthroat trout

11 Henrys Lake " " "

Sample length 200 feet

Table 41 Summary of fish numbers, fish species and (collected fish only) size for station 3CF in the Crow Creek drainage, October, 1974.

Size Class inches	Rb	Ct	Fish Species Br	Brown	Sc	Total
1.0	-	-	-	-	1	1
1.6	-	-	-	-	1	1
2.0	-	1	-	-	2	3
2.2	-	1	-	-	-	1
2.4	-	4	-	-	1	5
2.6	-	4	-	-	-	4
2.8	-	1	-	-	-	1
3.0	-	-	-	-	2	2
3.8	-	1	-	-	-	1
4.0	-	-	-	-	1	1
4.2	-	1	-	-	-	1
4.6	-	2	-	-	-	2
4.8	-	1	-	-	-	1
5.0	-	2	-	-	-	2
5.4	-	2	-	-	-	2
5.6	-	1	-	-	-	1
5.8	-	1	-	-	-	1
6.0	-	1	-	-	-	1
6.4	-	1	-	-	-	1
6.8	-	1	-	-	-	1
7.0	-	1	-	-	-	1
7.4	-	1	-	-	-	1
8.0	-	1	-	-	-	1
	-	28	-	-	8	36

8 cutthroat trout observed 2
 15 Snake River variety cutthroat trout
 3 Henrys Lake " " "
 Sample length 200 feet

Table 42 Summary of fish numbers, fish species and (collected fish only) size for station 4CF in the Crow Creek drainage, October, 1974.

Size Class inches	Rb	Ct	Fish Species Br	Brown	Sc	Total
1.6	-	1	-	-	-	1
1.8	-	1	-	-	-	1
2.0	-	2	-	-	1	3
2.2	-	4	-	-	-	4
2.4	-	5	-	-	1	6
2.6	-	3	-	-	1	4
2.8	-	1	-	-	-	1
3.6	-	1	-	-	-	1
3.8	-	-	-	-	1	1
4.0	-	1	-	-	-	1
6.0	-	1	-	-	-	1
6.2	-	1	-	-	-	1
6.8	-	1	-	-	-	1
7.8	-	1	-	-	-	1
8.7	-	1	-	-	-	1
	-	24	-	-	4	28

4 cutthroat trout observed

0 Henrys Lake variety cutthroat identified

5 Snake River " " "

Sample length 200 feet

Table 43 Summary of fish numbers, fish species and (collected fish only) size for station 1G in the Gravel Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
2.0	-	-	1	1
2.2	-	-	4	4
2.4	-	-	1	1
3.8	-	-	5	5
4.0	-	-	5	5
4.2	-	-	5	5
4.4	-	-	1	1
4.6	-	-	2	2
4.8	-	-	1	1
5.2	-	-	2	2
5.8	-	-	2	2
6.0	-	-	3	3
6.2	-	-	1	1
6.4	-	-	3	3
6.8	-	-	1	1
7.0	-	-	1	1
7.2	-	-	1	1
7.6	-	-	1	1
7.8	-	-	1	1
8.3	-	-	1	1
	-	-	42	42

27 brook trout observed

Sample length 200 feet

Table 44 Summary of fish numbers, fish species and (collected fish only) size for station 1DF in the Davies Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
	0	0	0	0

1 trout observed

Table 45 Summary of fish numbers, fish species and (collected fish only) size for station 1K in the Kendall Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
	0	0	0	0
None observed				

Table 46 Summary of fish numbers, fish species and (collected fish only) size for station 2K in the Kendall Creek drainage, October, 1974.

Size Class inches	Fish Species			Total
	Rb	Ct	Br	
	0	1	0	1
None Observed				

APPENDIX E:
Methods and Equipment

METHODS AND EQUIPMENT

Evaluation of the Physical Fluvial Aquatic Environment

The description and documentation of Angus Creek, Mill Creek and a small portion of the Blackfoot River aquatic fishery conditions used chemical, physical, and biological information. The three approaches used concurrently gives proper aquatic evaluation. However, most environments were only spot checked or evaluated on a SWAG opinion and actually have no information base at all.

Methods for aquatic evaluation used in the studied streams were satisfactory for selected parameters, for quantification, as water depths rarely exceeded 48 inches and water velocities were never excessive for instream work. The clear water with low flows (September and October) offered excellent conditions for observation measurement. Interpretation of year around stress to the aquatic resources in most streams, however, is lacking.

Stations

For physical stream condition analysis each station was selected randomly, marked on an aerial photograph (1-15, 846), and located on the ground. The first transect of each station was located 100 feet upstream from the photographic location to avoid any bias resulting from locating the stations with use of serial photographs.

Transects

A transect is defined as an imaginary line, with a measuring tape over it, which runs from bank to bank at a 90° angle to the centerline of the stream. The following measurements and conditional factors were recorded:

1. Stream, pool, and riffle width to nearest foot.
2. Four equal distance stream depths to nearest inch.
3. Pool rating, location and feature.
4. Stream channel surface material classification.
5. Streambank cover, condition and type.
6. Channel elevation and gradient.
7. Geologic process group and geomorphic type.
8. Embeddness
9. Channel stability
10. Fish-streamside environment rating
11. Streamside Habitat type
12. Livestock use
13. Streamside damage

Channel material

The composition of the surface material of the streambed was determined by direct measurement with measuring tapes or measuring rods. The transect of the stream channel was divided into one-foot intervals, and the dominant surface material, classified in Table 1, determined the one foot division.

Table D1. Classification of stream channel materials.

Particle Diameter Size		Substrate Classification
12	inches and over	boulder
3	inches to 11.9 inches	rubble
0.19	inches to 2.9 inches	gravel
0.18	inches and less	fine sediment

Evaluations of pool and riffle

Stream area was stratified as pool or riffle. The pools were each classified as to suitable for a fishery environment (Table 2). Width of riffle and pool was individually measured to the nearest foot and the sum of both would equal to the width of the stream.

Streamside environment

The condition, and cover of the streamside environment at each transect were rated as shown in Table 3. Streamside condition and cover influencing the stream and its banks were determined by evaluating the dominant influencing vegetative type or exposed condition. This evaluation considered the bank of the stream 50 feet upstream and 50 feet downstream from the interception of the transect and the bank. Streamside type is a habitat type at the end of each transect.

Table D1. Pool quality rating guide.

Pool			
Quality Class No.	Length or Width	Depth	Shelter ¹
1	Greater than a.c.w. ²	2' or deeper	Abundant ³
	Greater than a.c.w.	3' or deeper	Exposed ⁴
2	Greater than a.c.w.	2' or deeper	Exposed
	Greater than a.c.w.	< 2'	Intermediate
	Greater than a.c.w.	< 2'	Abundant
3	Equal to a.c.w.	< 2'	Intermediate
	Equal to a.c.w.	< 2'	Abundant
4	Equal to a.c.w.	Shallow ⁶	Exposed
	Less than a.c.w.	Shallow	Abundant
	Less than a.c.w.	Shallow	Intermediate
	Less than a.c.w.	< 2'	Intermediate
	Less than a.c.w.	2' or deeper	Abundant
5	Less than a.c.w.	Shallow	Exposed

1. Logs, stumps, boulders, and vegetation in or overhanging pool, or overhanging banks.
2. A.C.W.=Average channel width.
3. More than $\frac{1}{2}$ perimeter of pool has cover.
4. Less than $\frac{1}{4}$ of pool perimeter has cover.
5. $\frac{1}{4}$ to $\frac{1}{2}$ perimeter of pool has cover.
6. Approximately equal to average stream depth.

Table D3. Numerical ratings used to classify streambank cover, condition, and type.

Cover	Condition	Type (example only)
forested 4**	excellent 4	sod, root, log 4
brush 3	good 3	brush, rubble 3
grass 2	fair 2	grass, gravel 2
exposed 1	poor 1	finer, road fill 1

**In 1974, the numerical ratings used previously were multiplied by 2 to eliminate decimals.

Cover = Type or lack of cover dominating the streambanks.
 Condition = Stability of the streambank to water flows and fish.
 Type = A habitat type that can be a single character or combination of characters.

Channel gradient

Channel gradient was recorded at each station with a handheld clinometer and was the average gradient over the entire 200 foot channel section.

Width and depth

Stream width was the surface water width perpendicular with the flow of the stream and average station depth was obtained from four equal distance measurements. High flow surface width and high flow water depth was recorded in 1974.

Hydrochemical Sampling

Water samples were collected in inert plastic bottles, which had been stripped with reagent spectrometric grade nitric acid. The analysis was conducted by a graduate certified chemist from the Idaho Department of Health and Welfare using the guidelines outlined in Standard Methods (1971). Dissolved gas analysis was completed in the field using a Hack colorimetric Kit.

Biological

Macroinvertebrates

The macroinvertebrate population was assessed on four streams using artificial substrate samplers. The species diversity indexes were obtained by using methods developed by Cairns (1971). The dominance diversity indexes were obtained by utilizing methods developed by Shannon and Weaver (1948).

Fish standing crops and species composition

Fish were collected with a Smith-Root battery powered back pack shocker using 450 watts. Fish were identified to species and measured from tip of snout to longest tail lobe. Most streams, except Angus Creek, were only spot sampled to get a general idea of species numbers and composition. Stream sections sampled were 200 feet in length (Table 3).

Stream environment ratings

Streams were rated as to livestock influenced, mining influence, logging influence and fishery values as outlined in Table D5.

Table D4. Location of fish shocking stations in the phosphate land use planning area.

All fish shocking stations are marked on aerial photographs which are filed in the Ranger District and Zone Fishery Biologist Offices. Fish shocking stations are staked on each of the four corners and marked with engineer flagging tape.

Olsen Creek

Station 10F is located at the end of the road.

Crow Creek

Station 1CF begins at the downstream end of the Forest Service boundary.

Station 2 CF

Station 3CF begins at the overflow confluence of Dugway Creek on the Clark's property.

Station 4CF

Sheep Creek

Station 1 SF begins at the downstream Forest Service boundary at the wire fence.

Station 2 SF starts at large pine trees below forks and ends about 30 feet upstream from the forks.

Davies Creek

Station 1 DF begins at end of road.

Kendall Creek

Station 1 KF is the same location as physical station 1K.

Slug Creek

Station 1 SLF begins at the Downstream Forest Service boundary.

Georgetown Creek

Station 1GF begins at the Forest Service downstream boundary.

Station 2GF begins at the two large culverts by the large tailing fill.

Station 3GF ends at culvert outlet at mill site and gives downstream 200 feet

Station 4GF ends 25 feet above the road culvert at the first crossing above the mill.

Grand Creek

Station 1GF begins at the downstream Forest Service boundary and ends just above the Forest Service campground.

Table D5. Key to rating evaluation used in Tables 5 and 6 to identify conditions within the aquatic environment and its fisheries.

-
- 5 = No livestock use in area
 - 4 = Livestock use has occurred but stress is absent or insignificant
 - 3 = Livestock use has caused moderate stress
 - 2 = Livestock use has caused high stress
 - 1 = Livestock use has caused severe aquatic damage
-

Mining Influence Rating Key

- 5 = No mining in area
 - 4 = Mining has occurred but stress is absent or insignificant
 - 3 = Mining has caused moderate stress
 - 2 = Mining has caused high stress
 - 1 = Mining has caused severe aquatic damage
-

Logging Influence Rating Key

- 5 = No logging has occurred
 - 4 = Logging has occurred but stress is absent or insignificant
 - 3 = Logging has caused moderate stress
 - 2 = Logging has caused high stress
 - 1 = Logging has caused severe aquatic damage
-

Fishery Value Rating

- 5 = The aquatic environment produces excellent fish populations which are highly sought after by the recreationists. The stream or lake may contribute high numbers of fish to off-site streams receiving high recreation use.
- 4 = The aquatic environment produces good fish populations which are sought after by the recreationists. Or, the stream or lake contributes moderate numbers of fish to offsite streams receiving moderate recreation demand.
- 3 = The aquatic environment produces fair fish populations receiving some fishing pressure. Or, the stream contributes low numbers of fish to offsite streams used by recreationists.
- 2 = The aquatic environment produces some fish but stream or fishery conditions do not attract the fishing recreationists. Or, there is opportunity for this stream to contribute a low number of fish to offsite streams.
- 1 = The stream provides no fishing and if a fish population does exist there still is no significant value.

Stream Numbering System

The stream numbering system was adopted from the hydrologic report so streams referred to in each report, by the same number, are the same streams (Table 9).

SEAM

Platts, Wm. S.

AUTHOR

Preliminary aquatic environment
and fisheries info. flinput

TITLE

DATE DUE

BORROWER'S NAME

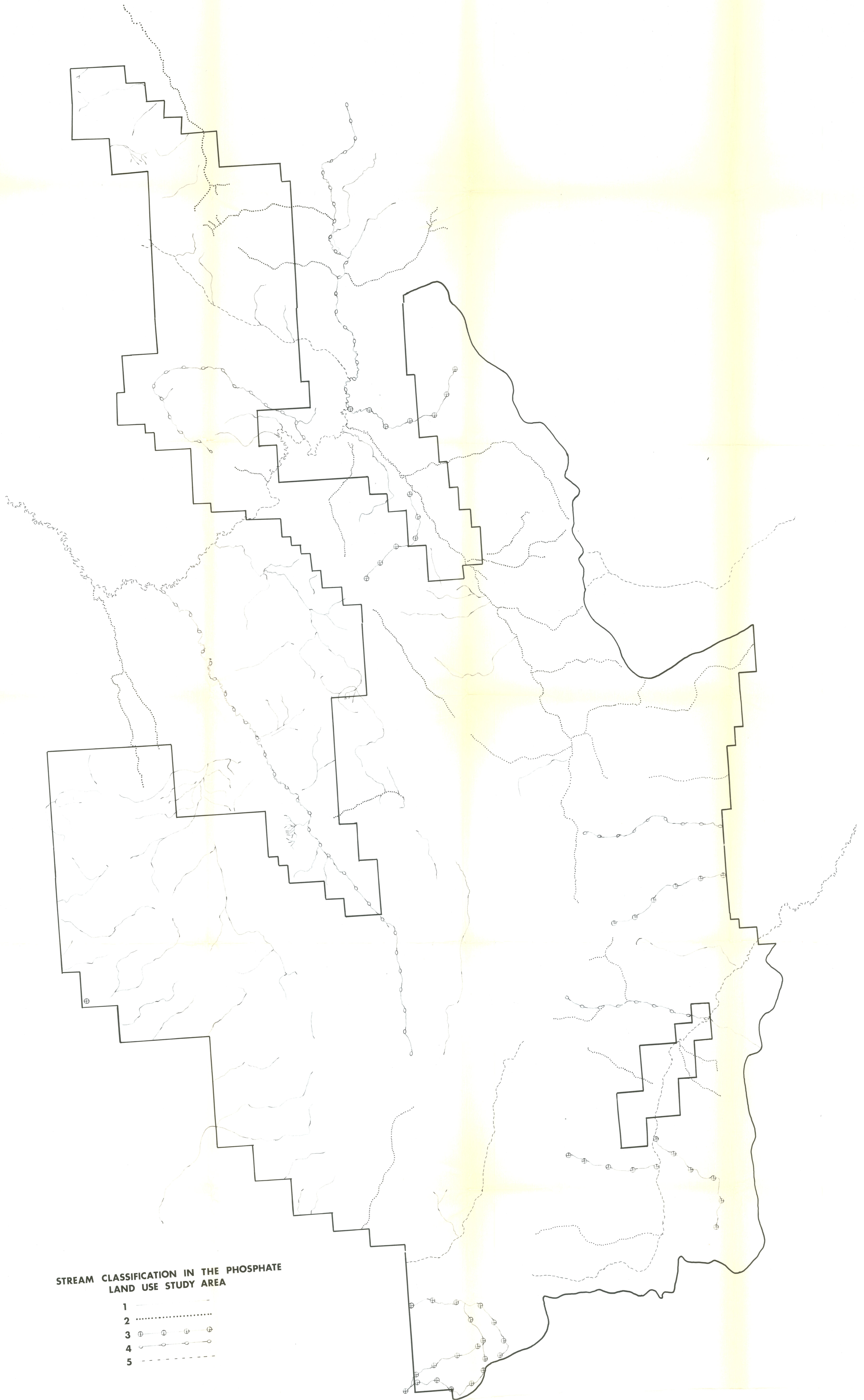
~~4-17-97 Suzanne Buntrock Eng.~~

FS INFO - INTERMOUNTAIN
INTERMOUNTAIN RESEARCH
STATION

324-25th Street
Ogden, UT 84401

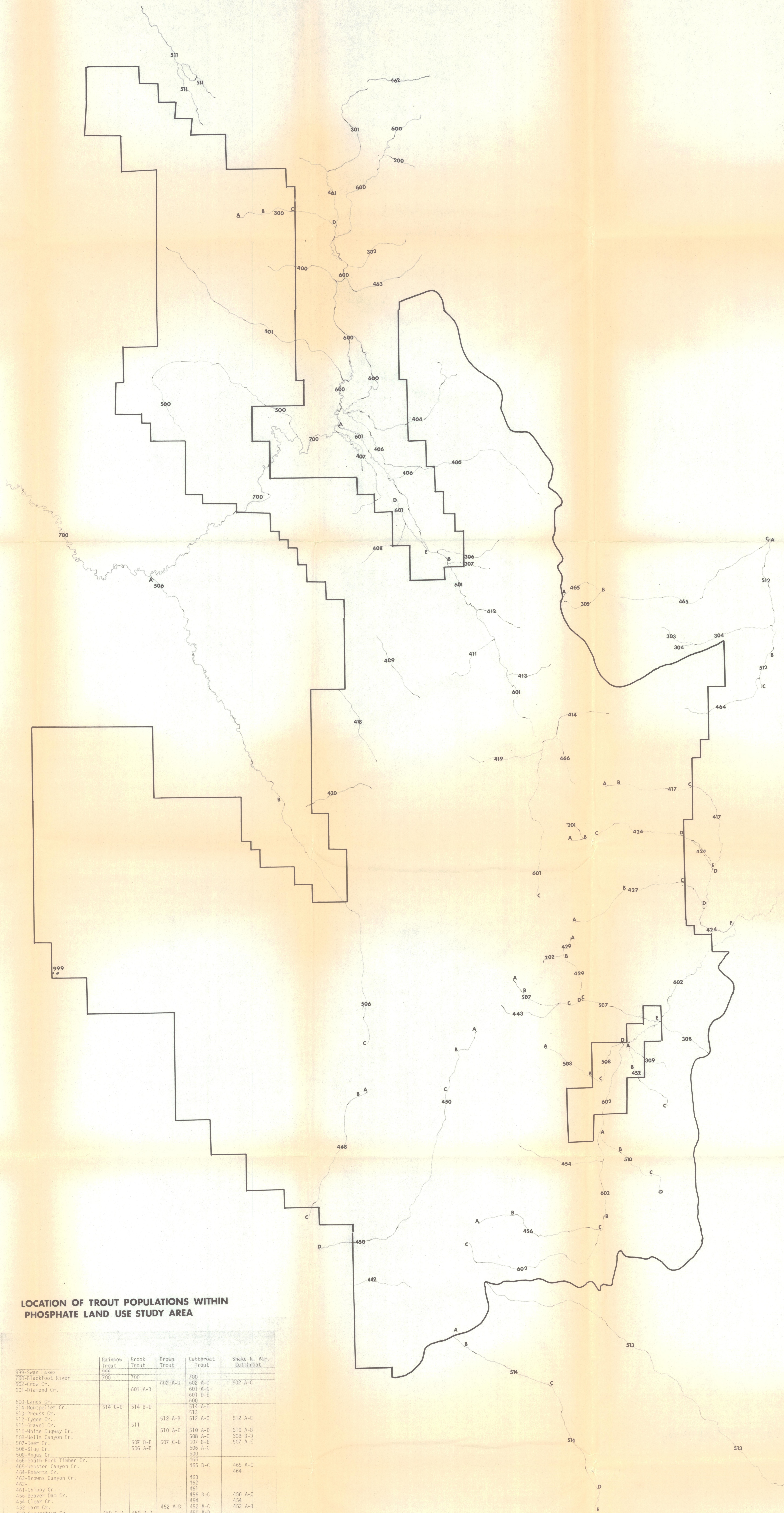
STREAM CLASSIFICATION IN THE PHOSPHATE
LAND USE STUDY AREA

- 1 ———
- 2 ·····
- 3 —○—○—○—○—○—
- 4 —○—○—○—○—○—
- 5 - - - - -



Appendix B: Location of Fish Species





LOCATION OF TROUT POPULATIONS WITHIN
PHOSPHATE LAND USE STUDY AREA

	Rainbow Trout	Brook Trout	Brown Trout	Cutthroat Trout	Snake R. Var. Cutthroat
999-Swan Lakes	999			700	
700-Blackfoot River	700	700		602 A-B	702 A-C
602-Crow Cr.			601 A-B	601 A-C	
601-Diamond Cr.				601 D-C	
600-Lanes Cr.				600	
514-Montpelier Cr.	514 C-E	514 B-D		514 A-E	
513-Trouss Cr.				513	
512-Tyger Cr.			512 A-B	512 A-C	512 A-C
511-Gravel Cr.	511		510 A-C	510 A-D	510 A-B
510-White Highway Cr.				508 A-C	509 B-D
508-Jells Canyon Cr.		507 D-E	507 C-E	507 D-E	507 A-C
507-Clear Cr.		506 A-B		506 A-C	
506-Slug Cr.				506	
505-Hogus Cr.				505	
466-South Fork Timber Cr.				466	
465-Webster Canyon Cr.				465 B-C	465 A-C
464-Roberts Cr.					464
463-Browns Canyon Cr.				463	
462-				462	
461-Chilpy Cr.				461	
456-Beaver Dam Cr.				456 A-C	456 A-C
454-Clear Cr.				454	
452-Lam Cr.			452 A-B	452 A-C	452 A-B
450-Georgetown Cr.	450 C-D	450 B-D		450 A-D	
448-Left Ft. Georgetown Can.	448 B-C	448 A-C		448 A-C	
443-South Fork Deer Cr.					443
442-Junco Cr.				442	
429-North Fork Deer Cr.				429 B-C	429 A-C
427-South Fork Sage Cr.				427 A-D	427 A-C
424-Sage Cr.			424 C-D	424 A-F	424 B-D
420-Goodheart Cr.		420		420	
419-Stewart Canyon Cr.				419	
418-Dry Valley Cr.				418	
417-Pole Canyon Cr.				417 A-C	417 A-C
414-Timber Cr.				414	
413-Deer Canyon Cr.				413	
412-Coyote Cr.				412	
411-Hornet Canyon Cr.				411	
409-Noble Cr.				409	
408-Sendall Canyon Cr.				408	
407-Mosquito Cr.				407	
406-Timothy Cr.				406	
404-Jason Cr.				404	
401-Sheep Cr.				401	
400-Laves Cr.				400	
399-Books Cr.				399	
308-Camel Hollow Cr.				308	
307-Yellow Jacket Cr.				307	
306-Cabin Cr.				306	
305-				305	305
304-Draney Cr.					304
303-Dry Fork Draney Cr.					303
302-Corralton Cr.				302	
301-				301	
202-Nisen Cr.				202	
201-				201	
200-				200	

Appendix A: Stream Classification

